

**Comments to Revised Draft EIR
Cabrillo Port**

#	Chapt/Sec	Page	Line	Comment
1.	Introduction 1.2.3	1-10	Gen.	This section addresses projections for increased natural gas demand in California. However, it fails to explain how the use of natural gas is affecting demand. In addition to its use for domestic heating and cooking, natural gas is of course used to generate electricity. In fact, the demand for natural gas is largely a function of California's need for replacement gas to fire existing power plants with cleaner, more environmentally sensitive fuel sources. According to the California Energy Commission (CEC), nearly half of all natural gas consumed in California is for the purposes of electricity generation (CEC, Natural Gas Assessment 2005, Chapter 7). Moreover, although Californians continue to use electricity more efficiently, the CEC reports that total electricity demand for these plants is growing. This is consistent with California's legislative and regulatory commitment to natural gas and other clean-burning fuels dating back to the 1970's. In fact, natural gas is quickly becoming a cleaner substitute for vehicle fuel. This section of the Revised Draft EIR should explain these factors in California's need for natural gas.
2.	Public Safety; Table 4.2-4	4.2-17		The Public Safety analysis needs more discussion of the remote probability/likelihood of an incident occurrence. Table 4.2-4 (p. 4.2-17) does not provide a comparison to the probabilities of an incident at Cabrillo Port which would correlate this data to the subject at hand.
3.	Aesthetics 4.4-4	4.4-19; 4.4-26		Several of the photo simulations indicate a simulated ship in the Traffic Separation Scheme as a reference point, but fail to clearly identify which is the ship and which is the FSRU, specifically Figures 4.4-13 and 4.4-14. To the casual reader, it might appear that the ship is the FSRU and therefore more visible than it actually would be.
4.	Agriculture	4.5-16; 4.5-18	8, 18-19; 30-31	Trees would not be prohibited within the permanent 50-foot maximum ROW. The 80-foot-wide ROW is a temporary construction easement, of which only 50 feet in width will be a permanent easement. Of the 50-foot permanent easement, only 33 feet would need to be maintained clear of any deep rooting or large trees to prevent tree roots from affecting the pipeline.
5.	Air Quality	4.6-27	34-35	Air emissions from construction in Los Angeles County will not exceed significance thresholds. Subsequent to submittal of construction emissions, BHP Billiton determined that there was a flaw in the construction emission calculations that caused emissions in Los Angeles County to be overestimated by approximately 15 percent. The most recent iteration of the project construction emission estimates was based upon the emission factors from a standard emissions modeling program for off road construction equipment (URBEMIS2002, Appendix H) for the period 1996-2000. However, URBEMIS2002, Appendix H provides emission factors for three distinct time periods (pre-1996, 1996-2000, and 2001+) and specifies a methodology for prorating emission factors based upon engine/equipment turnover. For example, Appendix H indicates that the turnover rate for the "bore/drill rigs" category is three (3) years while the turnover rate for the

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P449-A01-1

Thank you for the information. Sections 1.2.2 and 1.2.3 have been updated.

P449-A01-2

Summary information has been added to Section 4.2.1 to provide a context for the frequency of incident occurrence. As discussed, although the likelihood of a marine collision is low, the frequency of intentional events was not estimated due to uncertainty. Table 4.2-4 provides a context for considering transportation risk based on experience; it would not be appropriate to include data regarding the probability of an incident at Cabrillo Port.

P449-A01-3

In response to the comment, the simulated ships and FSRU in Figures 4.4-13 and 4.4-14 have been labeled.

P449-A01-4

Sections 4.5.3 and Impact AGR-1 in Section 4.5.4 have been revised and contain updated information on the restrictions regarding tree growth within the permanent right-of-way.

P449-A01-5

The Project has been modified since issuance of the March 2006 Revised Draft EIR. See Section 1.4.2 for a summary of Project changes. Section 4.6.1.3 contains revised information on Project emissions and proposed control measures. Section 4.6.4 discusses the health effects attributed to air pollutants and includes revised impacts and mitigation measures.

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				"cranes" category is nine (9) years. The construction emissions calculation in the draft General Conformity determination did not utilize the engine/equipment turnover methodology as dictated by URBEMIS2002, Appendix H. Therefore, BHP Billiton revised the construction emissions for Project onshore construction activity to incorporate the URBEMIS2002, Appendix H engine/equipment turnover methodology. See Exhibit 2.
6.	Air Quality	4.6-33; 4.6-34; 4.6-35	32-33 16-21 19	<p>The draft EIR states that the greatest level of Project vessel operations in Ventura County would occur on days when a tug and crew boat make transits from the FSRU to Port Hueneme and that in that situation the NOx and ROC emissions would be 33 and 4.5 pounds per day, respectively. The text continues to say that daily NOx exceed the VCAPCD significance threshold of 25 lbs/day. The annual tug emissions in District waters are 520 pounds based on 52 round trips per year (i.e., one round trip per week). The annual crew boat emissions are 620 pounds based on 182 round trips per year. This equates to 10.0 and 3.4 pounds per day, respectively. Even if a tug and a crew boat both performed a round trip on the same day, the maximum NOx emissions would be only 13.4 pounds per day, well below the VCAPCD significance threshold of 25 pounds per day.</p> <p>In addition, Project marine vessel emissions occurring within District waters and Federal waters will be addressed through an emission reduction program. As stated in relation to Impact Air-4, BHP Billiton has committed to implement an emission reduction program that would reduce NOx emissions by an amount up to the FSRU's annual NOx emissions. As concluded at 4.6-33, lines 32-33, this program reduces the impacts attributable to the FSRU below significance criteria. The marine vessel emissions in District (i.e., Ventura County) waters are considered part of the FSRU's emissions and so are already addressed by Impact Air-4 and considered insignificant. The marine vessel emissions in Federal waters are also subject to an emissions reduction program, which provides emission reductions that reduce impacts below significance criteria and so should also be considered insignificant. BHP Billiton has reached an agreement with the owners of two tugs to repower the vessel's aging engines, thus reducing NOx emissions in California Coastal Waters by an amount greater than the combined FSRU and Project marine vessel NOx emissions. Consequently, it is erroneously stated at page 4.6-35, line 19, that no mitigation is proposed for any vessel emissions in California Coastal Waters. Project marine vessel emissions should, in their entirety, be considered below significance criteria.</p>
7.	Air Quality	Gen.		Air Impacts Air-1, 2, 3 & 5 are classified as Class I impacts even where the identified mitigation measures appear to reduce the impact below a level of significance. Yet Air Impacts Air-4, 6, 7 & 8 are classified as Class III/insignificant, where the same mitigation measures are applied. Please clarify.

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P449-A01-6

Section 4.6.4 contains updated information on daily vessel emissions within Ventura County waters. This section also includes a description of the emission reduction projects proposed by the Applicant.

P449-A01-7

The Project has been modified since issuance of the March 2006 Revised Draft EIR. Section 4.6.4 contains updated information on air quality impacts and corresponding significance levels.

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Continued

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8.	Marine Biology	4.7-47 4.7-48	16-19 Table 4.7-8	The estimate on page 4.7-47 of total daily seawater uptake for the Project is based on Table 4.7-8 on page 4.7-48, which includes 264,200 gallons (1,000 m3) per hour of uncontaminated non-contact seawater. This is data that was issued in a letter to EPA dated May 18, 2004 for the 4 generators (not 5), but was later revised in a letter to EPA dated August 2005. The correct number is 142,000 gal/hr (3.4 MGPD), which is correctly stated in the Description of Proposed Action, p. 2-28 lines 9 to 11. This is an average figure based on using 2 generator engines for a normal average electrical load. The figure should also be corrected on Table 4.7-8 for Generator Cooling Water.
9.	Marine Biology 4.8.1.3	4.8-28	9-10	The DEIR refers to horizontal directional drilling (HDD) for onshore water body and road crossing, but it more likely means conventional horizontal boring, except for the South Fork Santa Clara River cross near Magic Mountain Parkway, which may be crossed by HDD. Please clarify.
10.	Cultural Resources	4.9-20	5-12	The Applicant's Measure AM CULT-1a Marine Archaeological Surveys indicates that the pipeline barges would use dynamic positioning rather than anchoring at deep water locations along the route to avoid impacts to cultural resources. However, the pipeline barge would have to utilize a normal anchor spread at near shore locations to stabilize their positions during HDB activities. This is discussed in BHP Billiton's "Anchor Mitigation Plan for HDB Near shore Pipeline Project Marine Operations" (July 2005). Please clarify.
11.	Land Use 4.13.2	4.13-15; 4.13-22	7-12 27-31	The Ventura County Zoning Ordinance appears to require a Conditional Use Permit (CUP) only for pipelines related to oil and gas extraction and production (See Section 8107-5, Ventura County Zoning Ordinance). Please clarify.
12.	Noise 4.14.4	4.14-17	31-33	Noise Impact NOI-6 (Class I) assumes that construction noise will violate noise ordinances. BHP Billiton has no intention of violating applicable ordinances. SoCalGas has indicated that encroachment permits may authorize construction during off-hours, which would not violate noise ordinances. Please clarify.
13.	Socioeconomics 4.16.1.2	4.16-9	18-20	The discussion regarding projected workforce estimates that about 85 percent of the construction workers for the onshore pipeline would be non-local workers who would temporarily relocate to the Project area. BHPB provided this estimate as a worst-case analysis of construction impacts in case workers needed to temporarily relocate. In actuality, BHPB anticipates a much higher percentage of local and regional workers, in which case the need for temporary housing, services and other socioeconomic impacts will decrease. Please clarify.

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The Project has been modified since issuance of the March 2006 Revised Draft EIR. See Section 1.4.2 for a summary of Project changes. The previously proposed FSRU generator engine cooling system used seawater as the source of cooling water for the four generator engines. The Applicant now proposes using a closed tempered loop cooling system that circulates water from two of the eight submerged combustion vaporizers (SCVs) through the engine room and back to the SCVs, which reduces the seawater intake volume by about 60 percent. The seawater cooling system would remain in place to serve as a backup system during maintenance of the SCVs or when the inert gas generator is operating. Section 2.2.2.4 contains a description of the proposed uptakes and water uses for the FSRU.

Section 4.7.4 contains information on uptake volumes and potential impacts of seawater uptake and discharge on marine biota, including ichthyoplankton from intake of seawater and, from thermal discharges of cooling water. The ichthyoplankton impact analysis (Appendix H1) includes both literature results and data from California Cooperative Oceanic Fisheries Investigations (CalCOFI) surveys. CalCOFI surveys have been consistently collected over a period of time and are the best scientific data currently available.

P449-A01-9

"Crossing Techniques" in Section 2.7.2 contains information on each proposed water-crossing method, and Tables 4.18-5 and 4.18-6 in Section 4.18.4 identify waterbody crossing methods for each waterbody along the proposed Project and alternative pipeline routes.

P449-A01-10

AM CULT-1a in Section 4.9 has been revised in response to the comment.

P449-A01-11

Although the Ventura County Zoning Ordinance appears to require a conditional use permit (CUP) only for pipelines related to oil and gas extraction and production, consultation with the Ventura County Planning Department indicates the potential need for a CUP.

P449-A01-12

Noise modeling indicates the potential to exceed noise ordinances; therefore, mitigation measures MM NOI-4f and MM NOI-5a were identified in addition to AM NOI-4a (see Section 4.14.4).

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The requested clarification has been made.

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14.	Water Quality	4.18-29	38-39	The discussion indicates Generator Cooling Water volume of 264,200 gallons per hour of uncontaminated non-contact seawater. This is data that was issued in a letter to EPA dated May 18, 2004 for the four generators, but was later revised in a letter to EPA dated August 2005. The correct number is 142,000 gal/hr (3.4 MGPD), which is correctly stated in the Description of Proposed Action, p. 2-28 lines 9 to 11. See Comment 8 above.

P449-A01-14

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The Project has been modified since issuance of the March 2006 Revised Draft EIR. See Section 1.4.2 for a summary of Project changes. Section 2.2.2.4 describes the proposed seawater uptakes and uses for the FSRU. (See also Appendices D5 and D6.)

P449-A01-15

Thank you for the information. This letter is Exhibit 2 of 2006
Comment Letter P449.



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April 13, 2006

LT Ken Kusano
U.S. Coast Guard Headquarters
Deepwater Port Standards Division (G-MSO-5)
2100 2nd Street SW
Washington, DC 20593-0001

Re: Comments on Draft Conformity Analysis

| P449-A01-15

Dear Lt Kusano:

BHP Billiton LNG International, Inc. ("BHPB") reviewed the draft General Conformity Determination prepared by the U.S. Coast Guard ("USCG") for the Cabrillo Port project and dated March 2006. In that document you requested comments by April 14, 2006 at 5:00 pm Eastern Standard Time. BHPB respectfully submits the following timely comments regarding the draft General Conformity Determination.

BHPB generally agrees with USCG's applicability assessment. As you note, Cabrillo Port is located outside of any nonattainment area and so its emissions are not subject to General Conformity. However, project-related construction activities take place within both Ventura County and Los Angeles County. Ventura County is nonattainment for ozone only and Los Angeles County is nonattainment for ozone, carbon monoxide, PM₁₀ and PM_{2.5}. Therefore, only those pollutants (NO_x and VOC/ROC as precursors for ozone) need be evaluated to determine whether they are under significance thresholds for their respective counties. As you noted, all pollutants other than NO_x were below the significance thresholds and so are not subject to General Conformity.

Subsequent to your receipt of the construction emissions numbers, BHPB determined that there was a flaw in the construction emission calculations that cause overall emissions to be overestimated by approximately 15 percent. The most recent iteration of the project construction emission estimates were based upon the URBEMIS2002, Appendix H emission factors for the period 1996-2000. However, URBEMIS2002, Appendix H provides emission factors for three distinct time periods (pre-1996, 1996-2000, and 2001+) and specifies a methodology for prorating emission factors based upon engine/equipment turnover. For example, Appendix H indicates that the turnover rate for

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the "bore/drill rigs" category is three (3) years while the turnover rate for the "cranes" category is nine (9) years. The construction emissions calculation in the draft General Conformity determination did not utilize the engine/equipment turnover methodology as dictated by URBEMIS2002, Appendix H.

The attached revised construction emission spreadsheets for Project onshore construction activity incorporate the URBEMIS2002, Appendix H engine/equipment turnover methodology. Annual emission rates for these construction activities were estimated using construction vehicle/equipment type in grams per horsepower hour and fleet averages based on vehicle turnover rates. The revised emission spreadsheets include footnotes with the emission factors listed by construction vehicle/equipment type.

Correcting the construction activity emission factors reduces NO_x emissions occurring in Los Angeles County to 24.16 tons per year based upon the emission calculation procedures outlined above. As you note in the draft determination, the General Conformity threshold in Los Angeles County is 25 tons per year. Since the these revised NO_x emission estimates fall below the General Conformity emission thresholds for NO_x, a General Conformity Determination is not required.

BHPB notes that in the draft Conformity Determination, the Coast Guard states that BHP "indicated that it would fully offset NO_x emissions generated from Project construction in Los Angeles County through the acquisition of emission credits or an equally enforceable measure that would result in emissions reductions equal to or greater than Project emissions in Los Angeles County." BHP respectfully notes that it has never indicated that it would offset its construction NO_x emissions in Los Angeles County. Instead, BHP has repeatedly stated that it would mitigate emissions to the extent required under the State Implementation Plan and CEQA requirements. Because the construction NO_x emissions in Los Angeles County (as well as Ventura County) are not considered significant, there is no need for mitigation.

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USCG
April 13, 2006
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Please contact me if there are any questions about these comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Renee K." followed by a stylized flourish.

Renee Klimczak
President, BHP Billiton LNG International

Attachments: Revised Construction Emission Calculation Spreadsheets

Copy to: Dwight Sanders, California State Lands Commission

Equipment Engine Emissions in Pounds per Day					
Activity	NO _x	SO _x	CO	PM _{10/2.5}	ROC
Trenching	252.3	0.3	402.7	8.8	42.5
Pipelay	226.9	1.3	1,114.2	7.4	60.1
Boring (VC)	316.4	0.3	445.6	9.2	52.8
Drilling (LAC)	747.6	0.6	1,050.3	22.4	124.8

Equipment Engine Emissions in Tons					
Activity	NO _x	SO _x	CO	PM _{10/2.5}	ROC
Trenching	22.70	0.03	36.25	0.80	3.83
Pipelay	16.54	0.10	84.88	0.53	4.48
Boring (VC)	4.75	0.00	6.68	0.14	0.79
Drilling (LAC)	11.21	0.01	15.75	0.34	1.87
Total Emissions	55.20	0.14	143.57	1.80	10.97

County Allocated Equipment Engine Emissions in Tons					
Location	NO _x	SO _x	CO	PM _{10/2.5}	ROC
Ventura County	31.04	0.09	87.84	1.03	6.36
Los Angeles County	24.16	0.05	55.73	0.77	4.61
Total Emissions	55.20	0.14	143.57	1.80	10.97

Assumptions

Ventura County contains 14.7 miles / 22 miles or 67% of the project

LA County contains 33% of the project

All annual trenching & pipelay emissions pro-rated for length of pipeline in each county

Hourly emissions are not pro-rated.

All HDD emissions allocated to LA County

All Boring emissions allocated to Ventura County

Equipment	Number of Trucks each	Engine Rating	Operation	Average	Working	Output	NOX	SOX	CD	PM10	ROC	NOX	SOX	CO	PM10	ROC
Type	Devices	BHP Each	hrs/day	Load	Days	bbls/hr/day (milday)	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs	lbs	lbs	lbs	lbs
Concrete Saw	1	50	12	50%	180	300	1.99	0.09	75.91	0.09	2.86	359	16	13609	16	51.5
Trenching Machine	1	1,000	12	80%	180	9600	122.75	0.10	179.60	3.39	21.6	22066	18	32392	610	381.0
Track Backhoe	1	500	12	80%	180	4900	72.98	0.05	84.13	3.07	10.58	13115	10	15143	552	1905
Front Loader	1	200	12	50%	180	1200	16.21	0.07	21.03	0.77	2.65	3279	2	3786	138	478
Bulldozer	1	200	12	50%	180	1200	16.21	0.07	21.03	0.77	2.65	3279	2	3786	138	478
Engine	1	200	12	50%	180	1200	16.21	0.07	21.03	0.77	2.65	3279	2	3786	138	478
TOTAL EMISSIONS, lbs																
						232	0	403	g	49		45,405	51	72,424	1,592	7,653
TOTAL EMISSIONS, tons																
												22.7	0.0	36.2	0.8	3.8

Emulsion Factors	Units	NOX	SOX	CO	PM10	ROC Reference
Trenchers	g/BHP-hr	5.800	0.005	8.500	0.160	1,000 URBEMIS2002 (Version 8.7, Appendix H, April 2005), 37 % eff., 15 ppm S
Tracked Loaders/Backhoes	g/BHP-hr	6.885	0.005	7.950	0.200	1,000 URBEMIS2002 (Version 8.7, Appendix H, April 2005), 37 % eff., 15 ppm S
Tracked Wheel Dozers	g/BHP-hr	6.885	0.005	7.950	0.200	1,000 URBEMIS2002 (Version 8.7, Appendix H, April 2005), 37 % eff., 15 ppm S
Off-Highway Equipment	g/BHP-hr	6.885	0.005	7.950	0.200	1,000 URBEMIS2002 (Version 8.7, Appendix H, April 2005), 37 % eff., 15 ppm S
Gasoline Off-Road	g/BHP-hr	3.015	0.131	114.315	0.131	4,328 SCACQ/CM CEGA-Air Quality Handbook, Table A93-A, 34.8% eff.
Heavy Duty Dump Truck	g/BHP-hr	15.104	0.048	0.731	0.119	9,228 EPA/NOI Dump Trucks, 17 summer, VCAPCE, 2000-w/100%, with TM, 37 % eff., 15 ppm S

Equipment	Number of Devices	Trucks each	Engine Rating	Operation	Average Load	Working Days	Output (bbl/hr/day)	NOX	SOX	PM10	ROC	SOX	CO	PM10	ROC
			BHP Each	hrs/day				lbs/day	lbs/day	lbs/day	lbs/day	lbs	lbs	lbs	lbs
Pump Truck (midday)	2	2	80	4	4	180	120	4.00	0.00	0.03	0.06	2	37	8	15
Utility Truck (midday)	2	2	60	4	4	180	120	4.00	0.00	0.21	0.08	2	37	6	31
Utility Truck (midday)	2	2	60	4	4	180	120	4.00	0.00	0.21	0.08	2	37	6	31
Heavy Fork Lift	1	1	200	12	50%	180	1200	15.34	0.01	22.49	0.42	2.65	2702	2	4048
Heavy Fork Truck (midday)	4	120	8	8	180	180	1200	15.34	0.01	22.49	0.42	2.65	2702	2	4048
Stainless Tanker (midday)	2	60	12	12	180	180	1200	15.34	0.01	22.49	0.42	2.65	2702	2	4048
Stainless Tanker	2	200	12	50%	180	1200	15.34	0.01	22.49	0.42	2.65	2702	2	4048	
Stainless Tanker	2	200	12	50%	180	1200	15.34	0.01	22.49	0.42	2.65	2702	2	4048	
Pipe Bending Machine	1	1	100	12	50%	180	1200	15.34	0.01	22.49	0.42	2.65	2702	2	4048
Welding Generator	1	1	100	12	50%	180	600	3.99	0.17	15.21	0.17	5.72	718	31	1000
Utility Generator	2	50	12	50%	180	600	3.99	0.17	15.21	0.17	5.72	718	31	1000	
Air Compressor	2	50	12	50%	180	600	3.99	0.17	15.21	0.17	5.72	718	31	1000	
Dewatering Pump	2	50	12	50%	180	600	3.99	0.17	15.21	0.17	5.72	718	31	1000	
Water Pump	2	50	12	50%	180	600	3.99	0.17	15.21	0.17	5.72	718	31	1000	
Fill Drill Slewfoot	1	1	100	12	50%	180	1200	18.21	0.01	21.03	0.77	2.65	3279	2	3768
Shaper/Grout Compactor	1	200	12	50%	180	1200	18.21	0.01	21.03	0.77	2.65	3279	2	3768	
Shaper/Grout Compactor	1	200	12	50%	180	1200	18.21	0.01	21.03	0.77	2.65	3279	2	3768	
Hydraulic Tanker	2	50	12	50%	180	1200	18.21	0.01	21.03	0.77	2.65	3279	2	3768	
Cement Truck (midday)	2	80	12	4	4	180	1200	3.99	0.37	15.21	0.17	5.72	718	31	1000
Asphalt Tank (midday)	2	60	100	12	50%	180	1200	4.00	0.01	0.23	0.03	0.06	359.6	1	18
Asphalt Tank (midday)	2	60	100	12	50%	180	1200	4.00	0.01	0.23	0.03	0.06	359.6	1	18
Asphalt Paving Machine	1	200	12	50%	180	1200	4.00	0.01	0.23	0.03	0.06	359.6	1	18	
Asphalt Roller	1	100	12	50%	180	1200	4.00	0.01	0.23	0.03	0.06	359.6	1	18	
TOTAL EMISSIONS, lbs								227	1	1,114	7	69	33,078	199	10,712
TOTAL EMISSIONS, tons								0.27	0.01	1.114	0.01	0.08	36.9	2.08	10.712

Emission Factors	NOX	SOX	CO	PM10	ROC Reference
Other Construction Equipment	5.885	0.005	7.950	0.260	1.000 URBEMIS2002 Version 8.7, Appendix H, April 2005, 37.1% eff, 15 ppm S
Air Trench Fork Lift	3.900	0.005	8.900	0.180	1.000 URBEMIS2002 Version 8.7, Appendix H, April 2005, 37.1% eff, 15 ppm S
gHPH-Air	5.885	0.005	7.950	0.260	1.000 URBEMIS2002 Version 8.7, Appendix H, April 2005, 37.1% eff, 15 ppm S
gHPH-PM10	5.885	0.005	7.950	0.260	1.000 URBEMIS2002 Version 8.7, Appendix H, April 2005, 37.1% eff, 15 ppm S
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gHPH-PM10	5.885	0.005	7.950	0.260	1.000 URBEMIS2002 Version 8.7, Appendix H, April

Boring Emissions

Equipment	Number of Trucks each	Engine Rating	Operation	Average	Working	Output	NOX	SOX	CO	PM10	ROC	NOX	SOX	CO	PM10	ROC
Type	Devices	mlday	hr/day	Load	Days	bhp/hr/day (mlday)	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
Horizontal Boring Rig	1	1,000	24	85%	30	18200	245.51	0.20	389.89	0.77	42.33	7.95	6	10794	203	1270
Truck Backhoe	1	200	12	50%	30	12000	18.21	0.01	21.03	0.77	2.69	0.48	0	631	23	79
Artisan Forklift	1	100	12	50%	30	6000	9.10	0.00	10.51	0.39	1.34	0.24	0	371	14	48
Light Crane	6	50	12	100%	30	4500	21.86	0.02	25.34	0.92	3.17	0.62	0	727	28	95
Heavy Lift Crane	1	500	6	50%	30	1500	18.18	0.02	28.11	0.93	3.31	0.75	0	943	16	59
18 Wheeler Truck (mlday)	2	60	4		30	120	4.00	0.01	0.24	0.03	0.06	0.12	0	6	1	2
TOTAL EMISSIONS, lbs							315	0.3	446	9	53	9.493	8	13,889	277	1,892
TOTAL EMISSIONS, tons																
Emission Factors																
Boring Rig	18BHP/hr						NOX	SOX	CO	PM10	ROC Reference					
Traditional Loaders Backhoes	18BHP/hr						5,800	0.005	8,500	0.160	1,000 URBEMIS2002 (Version 8.7, Appendix H, April 2005), 37.1% eff, 15 ppm S					
All Terrain Forklift	18BHP/hr						5,800	0.005	7,500	0.290	1,000 URBEMIS2002 (Version 8.7, Appendix H, April 2005), 37.1% eff, 15 ppm S					
Other Construction Equipment	18BHP/hr						5,800	0.005	8,500	0.160	1,000 URBEMIS2002 (Version 8.7, Appendix H, April 2005), 37.1% eff, 15 ppm S					
Gasoline Off-Road	18BHP/hr						5,800	0.005	7,500	0.290	1,000 URBEMIS2002 (Version 8.7, Appendix H, April 2005), 37.1% eff, 15 ppm S					
Heavy Heavy Duty (1005)	18BHP/hr						3,018	0.131	114,315	0.131	4,326 SCAQMD CESA Air Quality Handbook, Table A9-3-A, 34.6% eff					
							15,104	0.048	0.781	0.119	0.226 EMFAC2002: HDD Trucks, 77 summer, VGAPD, 2000-wt 100%, with NM, 37.1% eff, 15 ppm S					
Boring																
Support body	18BHP/hr						8,600	0.005	8,600	0.160	1,000 URBEMIS2002 (Version 8.7, Appendix H, April 2005), 37.1% eff, 15 ppm S					
Backhoe	18BHP/hr						116.43	0.02	445.03	0.23	57.84					
Percent							22.4%	23.9%	10.3%	28.6%	19.5%					

Drilling Emissions

Equipment	Number of	Trucks	Engine	Operation	Average	Working	Output	NOX	SOX	CO	PM10	ROC	NOX	SOX	CO	PM10	ROC
Type	Devices	each	Rating	hr/day	Load	Days	bhp-hr/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
Large Drilling Rig (HDD)	2	1	900	24	80%	30	19200	245.5	0.26	359.80	6.77	42.33	7.965	6	10.764	203	1,770
Mud Cleaner Generator	1	1	400	24	80%	30	7680	98.20	0.08	143.92	2.71	16.93	2.949	2	4.318	81	98
Fluid Handling Pumps	4	1	25	24	80%	30	5760	87.43	0.05	100.96	3.18	12.70	2.623	2	3.029	110	341
Track Baskhoe	1	1	200	12	50%	30	1200	18.21	0.01	21.03	0.77	2.65	0.48	0	0.83	23	79
All Terrain Forklift	1	1	100	12	50%	30	600	7.67	0.01	11.24	0.21	1.32	0.23	0	0.37	6	40
Heavy Lift Crane	6	1	20	12	100%	30	1440	21.86	0.02	26.24	0.92	3.17	0.55	0	0.75	26	95
Light Towers	1	1	500	6	50%	30	1500	19.18	0.02	28.11	0.93	3.31	0.575	0	0.843	16	99
Light Tower (w/boom)	2	1	60	6	50%	30	120	4.08	0.01	5.23	0.03	0.08	0.03	0	0.06	6	31
TOTAL EMISSIONS, lbs								748	1	1,928	22	123	22,427	19	31,829	672	3,144

TOTAL EMISSIONS, tons

Emission Factor	Units	NOX	SOX	CO	PM10	ROC Reference
Drilling Rig	99BHP-hr	5.800	0.005	8.500	0.180	1000 URBEMIS2002 (Version 8.7, Appendix 1, April 2005), 37.1% w/ 15 ppm S
Tracked LTL Loaders/Buckhoes	99BHP-hr	5.800	0.005	8.500	0.180	1000 URBEMIS2002 (Version 8.7, Appendix 1, April 2005), 37.1% w/ 15 ppm S
All Terrain Forklift	99BHP-hr	5.800	0.005	8.500	0.180	1000 URBEMIS2002 (Version 8.7, Appendix 1, April 2005), 37.1% w/ 15 ppm S
Generator	99BHP-hr	5.800	0.005	8.500	0.180	1000 URBEMIS2002 (Version 8.7, Appendix 1, April 2005), 37.1% w/ 15 ppm S
Other Construction Equipment	99BHP-hr	6.885	0.005	7.450	0.260	1000 URBEMIS2002 (Version 8.7, Appendix 1, April 2005), 37.1% w/ 15 ppm S
Gasoline Off-Road	99BHP-hr	3.015	0.131	114.315	0.131	4.326 SCAQMD CEQA Air Quality Handbook, Table A9.3-A, 34.6% w/ 15 ppm S
Heavy Duty Truck	99BHP-hr	15.164	0.048	0.731	0.119	0.228 EMFAC2002, HD Trucks, 17% summer, YAPACD 2000 w/100% with DM, 37.1% w/ 15 ppm S

Trucks bldg : 4.00 0.01 40.21 0.03 0.0%
 Support bldg : 0.5% 2.1% 0.0% 0.1% 0.0%
 Support bldg : 66.92 0.05 85.62 2.43 10.45
 Support bldg : 9.0% 8.3% 8.2% 10.6% 8.4%

dill 2 24 30 1440 16.7%
 bore 1 24 30 720 8.3%
 trench 1 12 180 2160 25.0%
 back hoe 1 12 180 2160 25.0%
 pilelay 1 12 180 8640 100.0%



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P449-A01-16

Thank you for the information. This letter is Exhibit 3 of 2006
 Comment Letter P449.

April 21, 2006

THOMAS R. WOOD
 Direct (503) 294-9396
 trwood@stoel.com

BY FAX AND BY MAIL

Amy Zimpfer
 Associate Director, Air Division
 U.S. Environmental Protection Agency
 75 Hawthorne Street
 San Francisco, CA 94105

**Re: Cabrillo Port Project
 NOx Emission Reduction Project Status Report**

| P449-A01-16

Dear Amy:

Last week I informed you that BHP Billiton LNG International Inc. ("BHP") had executed a contract with Sause Brothers ("Sause") to repower one of its oceangoing tugs with new low emitting and fuel efficient engines. We provided to you a redacted form of the contract and indicated that we were beginning the due diligence process by which we will document tug's route and anticipated emissions reductions. By this letter we are updating you as to BHP's due diligence efforts in regard to the Sause tug as well as informing you of an additional repowering contract that BHP recently executed that will provide additional NOx reductions in California Coastal Waters.

Sause Brothers Due Diligence Update

By signing the Sause contract, BHP and Sause committed to a careful examination of the tug fuel use and route history data. In my last letter, I provided to you a copy of the contract that BHP entered into with Sause. That contract specified the primary tug route information and Sause's estimate of the historic fuel usage. Historic information is limited with this particular vessel as Sause assumed this tug route from another company (Crowley) a little over a year ago. Therefore, Sause does not have access to the historic trip records predating its assumption of this contract. When Sause negotiated the contract with BHP it estimated fuel usage based upon the average number of long haul trips it expects to make annually for its client. That fuel usage is reflected in Attachment A to the contract. With the contract complete, BHP is now reviewing the last year's fuel use records and route logs. This information will be incorporated into a report we anticipate submitting to EPA in approximately one week. As BHP began this effort, its

Oregon
 Washington
 California
 Utah
 Idaho



Amy Zimpfer
April 21, 2006
Page 2

consultant determined that last year Sause did not complete as many trips as it expects to make annually under its service agreement with Chevron. As a result Sause's fuel usage appears to be less than what was identified to BHP when the contract was entered into. BHP is still working with Sause to determine whether the past year is representative of future activities or whether the trip load that Sause identified in the contract better predicts the average annual tug activity. This information will be contained in BHP's report. Based on the fuel records reviewed to date, we predict that the NOx emission reductions attributable to the Sause repowering project are approximately 123 tons per year.

Additional Mitigation Opportunity

BHP is pleased to inform you that on April 19, 2006 it executed a contract with Olympic Tug & Barge ("Olympic"), a maritime tug operator, to replace the engines in one of its tugs with modern Tier 2 compliant diesel fired engines. Olympic operates a long haul tug line between the Port of Richmond and the Port of Los Angeles/Port of Long Beach. The entire route of this vessel is in California Coastal Waters. In addition, the Olympic tug performs lightering services under a long term contract whereby it transports crude oil from Ellwood Platform (off the southern portion of Santa Barbara County) to the Shell refinery in Long Beach. The tug also lighters oil from tankers anchored in California Coastal Waters off Los Angeles County to the Wilmington refineries. As with the Sause tug, Olympic's tug has engines that are quite old and, therefore, are both significantly less fuel efficient and significantly higher emitting. By replacing the two propulsion engines and the two auxiliary engines with modern low emitting engines, emissions should be reduced considerably. BHP's initial estimates based on the information provided to it by Olympic in the process of developing the contract (and documented in Attachment A to the contract) are that the repower project will reduce NOx emissions by approximately 96.7 tons per year. BHP is now commencing its due diligence and will confirm that the information presented by Olympic in the contract negotiations is fully supported by the record. BHP will continue to work with your team as the company performs its due diligence.

We have included a fully executed copy of the contract between BHP and Olympic as documentation of BHP's right to these emission reductions. Please note that consistent with the terms of the contract we have redacted the financial terms. By executing this contract with Olympic, in addition to the contract the company previously executed with Sause, BHP believes that it has fully met its obligation to find emission reduction projects equal to the stationary source NOx emissions.



Amy Zimpfer
April 21, 2006
Page 3

BHP is pleased to provide you with this update on the company's continued efforts to obtain NOx emission reductions. If you have any questions about either the Sause or Olympic repowering projects, please call me.

Sincerely,

A handwritten signature in cursive script that reads "Thomas R. Wood".

Thomas R. Wood

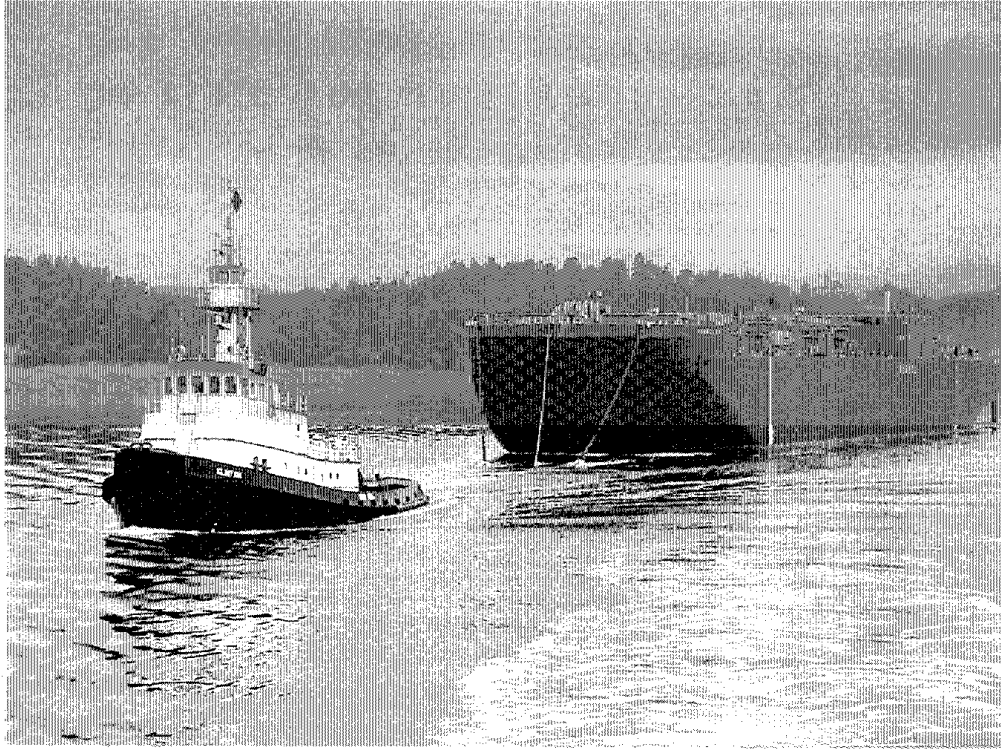
cc: Renee Klimczak
Rick Abel
Margaret Alkon
Dwight Sanders
Bob Fletcher
Mike Villegas

Line Haul Tug M/V Klihyam Low-NOx Repower Project

P449-A01-17

Thank you for the information. This report is Exhibit 3 of 2006
Comment Letter P449.

P449-A01-17



Prepared for: BHP Billiton Cabrillo Port Offshore LNG Terminal

Prepared by: OceanAir Environmental, LLC

Report #: OAE-BHP-03

Date: May 2, 2006

MN KLIHYAM REPOWER PROJECT

Background

BHP Billiton LNG International, Inc. (BHP) is proposing to build a LNG importation terminal located in Federal waters approximately 14 miles off the Coast of Ventura County. The terminal consists of a Floating Storage and Regasification Unit (FSRU) which is used to store and vaporize liquefied natural gas (LNG). LNG delivered from LNG carriers is offloaded to the FSRU, stored until needed and then regasified. Gas is then transported via two parallel 24-inch pipelines to an onshore facility at Ormand Beach near Oxnard in Ventura County. The project location is 2.06 nautical miles from the edge of shipping channel.

BHP has offered to mitigate the proposed project's NOx emissions by funding engine conversions for third party marine vessels operated along the California Coast. This report identifies one of these vessels, the MN Klihyam, and documents the anticipated emission reductions as a result of the engine repowering as well as the areas where the anticipated emission reductions are expected to occur.

Proposed Mitigation Project

Project

Repower the line haul tug boat M/V Klihyam operated by Sause Brothers, Inc. with low-NOx engines.

MN Klihyam Details

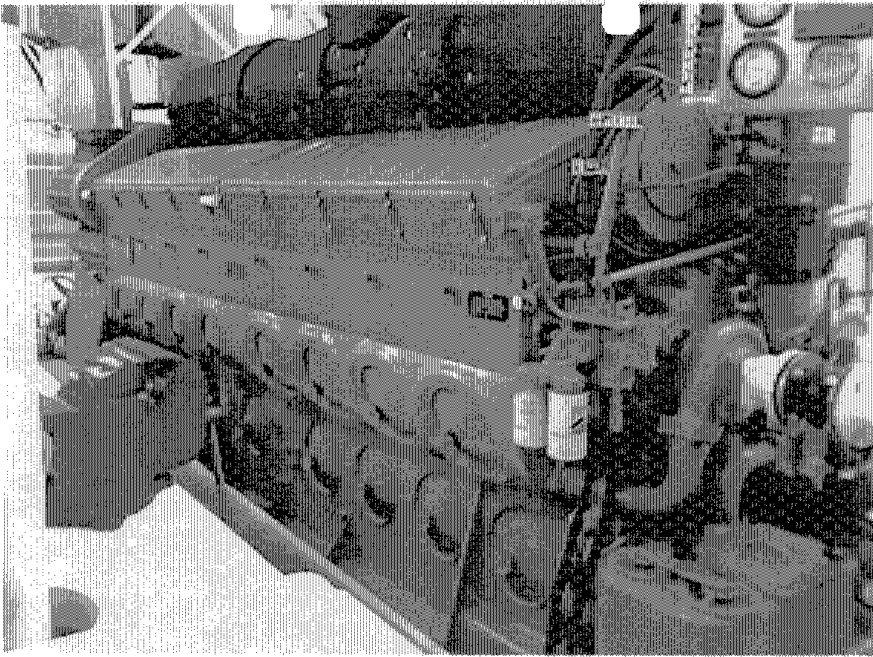
MN Klihyam details are as follows:

Official number	1084928
Gross tonnage	197
Net tonnage	134
Length	114' 9.5"

M/V Klihyam Baseline (i.e., Existing) Engines

The M/V Klihyam utilizes two engines for propulsion. Both are Electro-Motive Diesel (EMD) 16-645E6 engines which generate 1,950 h.p. at 900 rpm. The model numbers for each engine are stated below:

S/N Port 81-H1-1055, MY 1981
S/N Starboard 82-M2-1008, MY 1982



Project Description

Sause Brothers, Inc. uses the line haul tug M/V Klihyam primarily to tow the barge Sunset Bay from Richmond to Los Angeles. References to Los Angeles are intended to also include Long Beach and El Segundo. The vessel also occasionally makes trip into Martinez, Benicia, and San Francisco. Sunset Bay barge hauls petroleum products and is equipped with a vapor recovery system. Sunset Bay generators and engines already comply with USEPA Tier II emission limits.

Sause Brothers took over this line haul run in December 2004 and began operation on December 28, 2004. Prior to Sause operation, the service was being provided by Crowley Maritime. Sause Brothers is using the M/V Klihyam for this operation with a combined total horsepower of 3,900.

Engine Repower

The engine repower project consists of replacing M/V Klihyam's existing diesel propulsion engines (dual EMD12-645E6 engines) with new low-emissions EMD8-710G7B diesel propulsion engines. The 8-710G7B engines are rated at 2,000 h.p. each at 900 rpm. 8-710G7B engines are electronically controlled while the 12-645E6 engines are mechanically controlled. The electronic controls ensure more precise operation and

lower emissions per brake horsepower-hour (bhp-hr). Additionally 8-710G7B engines are more fuel efficient compared to the existing 12-645E6 engines.

Emission Reduction Calculations and Documentation

a. Historical Operation

M/V Klihyam began operation on December 28, 2004, towing petroleum barge Sunset Bay. Therefore, the evaluation of operating history is limited to this time as the previous route operator's records are not available for inspection. The review consisted of both reviewing the fuel logs and reviewing the trip logs.

The fuel logs document that in 2005 a total of 553,742 gallons of diesel was burned in MN Klihyam. This amount includes 40,000 gallons that was purchased in late December 2004. M/V Klihyam took on 71,000 gallons of fuel on Dec 14, 2004, the majority of which was consumed in January 2005 when the revenue service operation began. OceanAir has conservatively considered only 40,000 gallons out of the 71,000 gallons of fuel to have been burned in January 2005. A summary of the fuel logs is presented in Section D of Attachment A.

The trip logs document that M/V Klihyam took a total of 270 trips. Of this total, 43 were line haul trips (inter-coastal), 144 trips occurred locally within the Los Angeles, El Segundo and Long Beach area, and 83 trips occurred locally within the Richmond, San Francisco, Martinez, Benicia, and Rodeo area. Copies of the actual trip logs are included in Attachment B and a summary of the trip routes, along with distances and trip time, are presented in Section E of Attachment A.

b. Emission Reduction Calculation Formula

In order to calculate the emission reductions attributable to the MN Klihyam engine repower, OceanAir utilized the equation memorialized in South Coast AQMD Rule 1631(f). Rule 1631 established a program for the generation of mobile source emission reduction credits (MSERCs) through the repowering of diesel-fueled marine vessels. This rule was the subject of prolonged discussion between US EPA Region 9, South Coast AQMD and various stakeholders. This effort generated a rule that took into account multiple perspectives while ensuring a reasonably conservative means of MSERC calculation. This rule has been approved by EPA as part of the California State Implementation Plan. As a result, Rule 1631 is uniquely appropriate for the calculation of the anticipated emission reductions attributable to this marine engine repower project.

Consistent with Rule 1631, the emission reductions attributable to the repowering of MN Klihyam were quantified using the following equation:

$$ER_{\text{minyam}} = (EF_{\text{base}} - EF_{\text{repower}}) \times ECF \times \text{Fuel Burn} / 454 / 2000$$

Where:

EF_{base} = Baseline Emission Factor (gms/bhp-hr)
 $EF_{repower}$ = Repower Emission Factor (gms/bhp-hr)
 ECF = Energy Consumption Factor (bhp-hr/gal)

The basis for each of these variables is explained below.

c. Baseline Emission Factor (EF_{base})

The baseline emission factor for NOx was taken from 1992 emissions information by EMD, the engine manufacturer, for the 16-645 roots blown engine type. A copy of this specification sheet is included as Attachment C. The PM emission factor was taken from off-road default information for the model year.

d. Repower Emission Factor ($EF_{repower}$)

The repower emission factors were based on the Tier 2 emission limits. As documentation of compliance with these limits, OceanAir has included as Attachment D EMD's Certificate of Conformity.

e. Energy Consumption Factor (ECF)

The Energy Consumption Factor was derived from information in the EPA 2006 Model Year Certificate of Conformity. Specifically, the brake specific fuel consumption (bsfc) is identified in the Certificate of Conformity Propeller Cube Curve as 0.314 lb/bhp-hr at 900 rpm. At a fuel density of 7.1 lb/gallon, the ECF calculates to 22.61 bhp-hr/gal. This calculation is shown in Section C of Attachment A.

f. Emission Reduction Calculations

Based on the formula and variables identified above, OceanAir calculated the emission reductions anticipated to result from the repowering of the M/V Klihyam. Details for this calculation are shown in Section C of Attachment A. In total, it is projected that as a result of the MN Klihyam engine repower project NOx emissions in California Coastal Waters will be reduced by 138.71 tons per year and that particulate emissions will be reduced by 4.52 tons per year. Emission reductions by segment and by air district are presented in Sections C.1 and C.2 of Attachment A.

P449-A01-18

Thank you for the information. This report is Exhibit 5 of 2006
Comment Letter P449.

**California Environmental Quality Act
Air Quality Impact Assessment
of the BHP Cabrillo Deepwater Port
LNG Import Terminal**

P449-A01-18

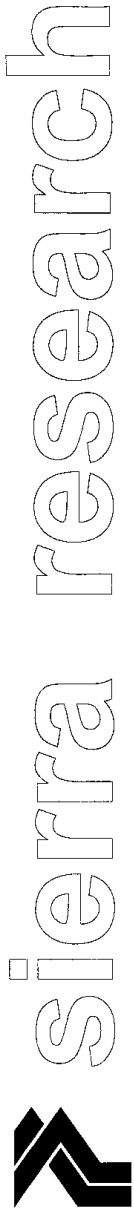
prepared for:

BHP Billiton

April 14, 2006

prepared by:

Sierra Research, Inc.
1801 J Street
Sacramento, California 95814
(916) 444-6666



SUMMARY

BHP Billiton LNG International, Inc. (BHP), EPA Region IX (EPA), and the California State Lands Commission (State Lands) are currently assessing the impacts of the proposed Cabrillo Port Offshore LNG Import Terminal (Cabrillo Port). An ambient air impacts analysis was prepared as part of the December 30, 2003 PSD permit application. The modeling has been refined several times to reflect improved project design elements and additional refinements to the analysis that were requested by EPA and other reviewers. The following modeling analysis was prepared to update the ambient air impacts analysis to reflect BHP's latest refinements to the emission rates¹.

The modeling analysis is based on predicted maximum Cabrillo Port emissions. NO_x, SO₂, CO, and PM₁₀/PM_{2.5} emissions from the stationary source (including the support vessels and LNG carriers in District and Federal waters) were modeled using the EPA-approved Offshore and Coastal Dispersion (OCD) Model. The overwater receptor grid extended approximately 22 miles up and down the coast from the FSRU. The overland receptor grid extended two miles inland from the shoreline between Oxnard and Point Dume, and receptors were also placed at 100 meter intervals along the shoreline from Point Dume to the Palos Verdes Peninsula in the South Coast Air Basin (SoCAB). Worst-case impacts were determined at both onshore and offshore receptors. Ambient impacts at the worst-case onshore receptor for each pollutant were well below the federal significance thresholds. For example, NO₂ and PM₁₀ levels at the worst-case onshore receptor are expected to be less than five percent of the applicable significance thresholds. Based upon this modeling, Cabrillo Port will not materially impact onshore air quality and will not cause or contribute to onshore ambient air quality standard violations.

1.0 AIR QUALITY IMPACT ANALYSIS

1.1 AIR QUALITY MODELING METHODOLOGY

As for the original air quality impact analysis performed for the project in the PSD permit application, this update to the air quality impact analysis used the OCD Model. The offshore meteorological data set used by the model is identical to that used in the December 2005 air quality impact analysis, and had previously been expanded and updated from the three-year data set originally used.² The meteorological data set consists of data collected during 2000--2004 by the National Oceanic and Atmospheric Administration (NOAA) at Buoy Station 46025 – Santa Monica Basin. Mixing heights were set to 500 meters and relative humidity was set to 80%. The original ambient air impacts analysis had been further revised to include potential effects of platform downwash using the same FSRU dimensions that were used for the screening analysis for ammonia impacts. The OCD model was recompiled to allow the use of up to 50,000

¹ Revised emissions estimates are being submitted under separate cover.

² NOAA Buoy Station 46025, 1991-1993.

receptors per run. No changes to the model or meteorological data have been made since the December 2005 submittal.

1.2 PROJECT EMISSIONS

Initial estimates of the Project's emissions were included in the December 2003 PSD application. Updated estimates provided in August 2004 formed the basis for the October 2004 Draft EIR prepared by State Lands. In late 2005, BHP revised downward the estimated emissions attributable to certain of the sources as the result of utilization of equipment that will meet the Tier 2 non-road diesel emission standards. In addition, the Project emissions estimates were revised to include natural gas-fueled support vessel operations in District and federal waters.

The current analysis reflects new and generally lower emission rates provided to BHP by Wartsila for the main generators and the support tug engines. The revised emission rates were used in this air quality impact analysis. Table 1-1 below summarizes the revised emissions from the sources located on the FSRU and from vessel operations in District and federal waters.

The activity data on which these emissions calculations are based are being provided to the agencies by the applicant under separate cover. These activity data were also the basis for calculation of emissions over shorter periods to allow comparison of modeled impacts with short-term ambient air quality standards. The emission rates used in the modeling analysis are shown in the appendix.

1.3 AIR QUALITY IMPACT ANALYSIS

1.3.1 Receptor Locations

The overwater receptor grid extended approximately 22 miles up and down the coast from the FSRU. The overland receptor grid extended two miles inland from the shoreline with additional receptors in the Oxnard area. Additional receptors were placed along the shoreline of the South Coast Air Basin from Point Dume to the Palos Verdes peninsula.

Receptors have been excluded from a 500-meter exclusion zone surrounding the FSRU. Under federal law (33 CFR 165.2 Subpart C, Safety Zones), a safety zone is an area "to which for safety or environmental purposes, access is limited to authorized persons, vehicles, or vessels. It may be stationary and described by fixed limits or it may be described as a zone around a vessel in motion." The Applicant has requested from the U.S. Coast Guard a safety zone with a radius of 500 meters from the outer edge of the FSRU. If the project is approved, the safety zone will be added to navigation charts as a limited access area only, established in accordance with 33 CFR Part 150. Only LNG carriers bound for the FSRU and service and supply vessels associated with the FSRU and LNG

Table 1-1
Cabrillo Port Operational Emissions Summary

Description	Emissions, tons per year				
	NOx	ROC	CO	SO ₂	PM ₁₀ /PM _{2.5} ^a
Stationary Source (FSRU)					
Wartsila 9L50DF Main Generators	12.2	24.5	20.8	0.07	8.1
Wartsila 9L50DF Backup Generator	1.9	0.3	0.2	<0.1	0.1
Submerged Combustion Vaporizers	48.9	3.5	148.9	0.33	3.8
Emergency Fire Pump and Generator	3.0	0.4	1.9	<0.1	0.1
Freefall Lifeboat	<0.1	<0.1	<0.1	<0.1	<0.1
Diesel Fuel Storage Tank	-0-	<0.1	-0-	-0-	-0-
Total Stationary Source	66.1	28.7	171.7	0.41	12.1
Marine Vessels, District Waters^b					
Tug Supply Boats	0.3	0.1	0.4	<0.1	<0.1
Crew Boat	0.3	0.1	0.3	<0.1	<0.1
Subtotal, District Waters	0.6	0.2	0.7	<0.1	<0.1
Marine Vessels, Federal Waters^c					
Tug Supply Boats	33.3	12.7	47.1	<0.1	1.7
Crew Boat	1.5	0.3	1.4	<0.1	<0.1
LNG Carrier	61.9	8.4	40.0	<0.1	0.8
Subtotal, Federal Waters	96.7	21.4	88.5	<0.1	2.5

Notes:

a. All PM₁₀ assumed to be PM_{2.5}.

b. District waters extend approximately 3.5 miles from shoreline.

c. Federal waters extend from the District water boundary to approximately 25 miles from shoreline.

carrier operations would be allowed to enter the safety zone. By federal law, the general public would no longer have access to this area. The safety zone would be rigorously patrolled to prevent the incursion of unauthorized personnel.

This exclusion is consistent with the December 19, 1980 letter from Douglas Costle to Senator Jennings Randolph stating that an "exemption from ambient air is available only for the atmosphere over land owned or controlled by the source and to which public access is precluded by a fence or other physical barriers." This exemption was further clarified in an April 30, 1987 letter from G.T. Helms of OAQPS to Steve Rothblatt, Chief of the Region V Air Division, stating that receptors must be placed in a river that is a public waterway because it is not controlled by the source. However, the letter also lays out the conditions under which the adjacent riverbank may be excluded from ambient air: "[t]he riverbank must be clearly posted and regularly patrolled by plant security. It must

be very clear that the area is not public." Because the safety zone is an area that will be controlled by the source, clearly posted on navigational charts, and rigorously patrolled, the general public will not have access to the area and the safety zone is not considered to be ambient air. This approach is consistent with the way in which EPA Region 6 handled the safety zone for the El Paso Energy Bridge (now, Gulf Gateway Energy Bridge). In that situation, EPA recognized that the general public is excluded from the safety zone and so the area within the safety zone does not meet the definition of "ambient air."

1.3.2 Results of the Air Quality Impact Analysis

Results of the air quality modeling analysis are summarized in Tables 1-2 through 1-5. Tables 1-2 and 1-3 compare the maximum modeled concentrations from project emissions to the PSD significance thresholds and Class II increments. Stationary source impacts and stationary source plus marine vessel impacts are shown separately. Tables 1-2 and 1-3 show that the maximum project impacts for all pollutants and averaging periods occur at sea. Tables 1-2 and 1-3 also show that with the exception of annual average impacts, maximum modeled impacts of the project in the South Coast Air Basin are less than half of the maximum modeled onshore impacts. With the exception of annual average NO₂, all project impacts are well below all significance thresholds. The area in which the modeled annual average NO₂ concentrations exceed the significant impact level extends less than 3,000 meters to the east of the Coast Guard exclusion zone, immediately adjacent to the FSRU and located over 10 miles from any onshore receptors. Modeled impacts for all pollutants and averaging periods are much lower onshore.

Eight-hour average NO₂ concentrations are presented in lieu of ozone modeling; this issue is discussed in greater detail below.

Tables 1-4 and 1-5 show, for stationary sources and all sources, respectively, the maximum modeled onshore impacts from the project combined with representative background pollutant concentrations, and compare these total projected impacts with the state and federal ambient air quality standards. These results show that emissions from the proposed FSRU would not cause or contribute to any violations of any state or federal ambient air quality standard. EPA has stated that it is its longstanding policy to use significant impact levels to determine whether a proposed new or modified source will cause or contribute significantly to a violation of the national ambient air quality standards (NAAQS) or PSD increments. If a source's maximum impacts are below the significant impact levels, then the source is judged to not cause or contribute significantly to a NAAQS or increment violation. As the Project's onshore impacts are well below the significant impact levels for each pollutant, the Project will not cause or contribute to a NAAQS or increment violation.

The District consists of both attainment and nonattainment areas. Anacapa Island and San Nicolas Island are within the District boundaries and are designated as attainment for all federal standards. The portion of the County on the mainland is designated as a moderate nonattainment area for ozone and as

an attainment area for all other federal standards. The Project is essentially the same distance from Anacapa Island as the mainland. In Figures 1-9 through 1-12 it can be seen that the impacts to Anacapa Island from the combined FSRU source and marine vessel emissions are less than or equal to the impacts on the mainland for all pollutants. Therefore, this report focuses on impacts to the mainland.

Table 1-2
Comparison of Maximum Modeled Stationary Source Impacts with PSD Significance
Thresholds and Class II Increments

Pollutant	Avg Period	Max. Modeled Offshore Impact ($\mu\text{g}/\text{m}^3$)	Max. Modeled Onshore Impact ($\mu\text{g}/\text{m}^3$)	Max. Modeled Impact in SoCAB ($\mu\text{g}/\text{m}^3$) ^a	PSD Significance Threshold ($\mu\text{g}/\text{m}^3$)	PSD Class II Increment ($\mu\text{g}/\text{m}^3$)
NO ₂ ^b	1-hour	173.0	31.7	9.1	--	--
	8-hour ^c	23.9	1.5	0.6	--	--
	annual	2.1	0.015	0.015	1.0	25
SO ₂	1-hour	0.3	0.08	0.02	--	--
	3-hour	0.2	0.02	0.01	25	325
	24-hour	0.1	<0.01	<0.01	5	91
	annual	0.01	<0.01	<0.01	1.0	20
CO	1-hour	155.3	37.2	10.4	2,000	--
	8-hour	64.8	3.6	1.3	500	--
PM ₁₀ /PM _{2.5}	24-hour	0.8	0.1	0.03	5	30
	annual	0.2	<0.01	<0.01	1.0	17

Note: a. See Figure 1-18 for locations of SoCAB receptors.

b. To be conservative, all NO_x is assumed to be NO₂ in evaluating ambient impacts.

c. 8-hr average NO₂ concentration is modeled for use in estimating project ozone impacts.

Table 1-3
Comparison of Maximum Modeled Project Impacts with PSD Significance Thresholds and
Class II Increments (Stationary Sources and Marine Vessels, Including LNG Carriers)

Pollutant	Avg Period	Max. Modeled Offshore Impact ($\mu\text{g}/\text{m}^3$)	Max. Modeled Onshore Impact ($\mu\text{g}/\text{m}^3$)	Max. Modeled Impact in SoCAB ($\mu\text{g}/\text{m}^3$)	PSD Significance Threshold ($\mu\text{g}/\text{m}^3$)	PSD Class II Increment ($\mu\text{g}/\text{m}^3$)
NO ₂ ^a	1-hour	186.2	41.3	12.7	--	--
	8-hour ^b	32.2	4.3	1.3	--	--
	annual	2.8	0.035	0.035	1.0	25
SO ₂	1-hour	0.3	0.08	0.02	--	--
	3-hour	0.2	0.02	0.01	25	325
	24-hour	0.1	<0.01	<0.01	5	91
	annual	0.01	<0.01	<0.01	1.0	20
CO	1-hour	173.1	41.8	13.8	2,000	--
	8-hour	74.1	4.9	1.9	500	--
PM ₁₀ /PM _{2.5}	24-hour	1.0	0.1	0.04	5	30
	annual	0.2	<0.01	<0.01	1.0	17

Note: a. To be conservative, all NO_x is assumed to be NO₂ in evaluating ambient impacts.

b. 8-hr average NO₂ concentration is modeled for use in estimating project ozone impacts.

Table 1-4
Comparison of Maximum Modeled Onshore Stationary Source Impacts with Ambient Air Quality Standards

Pollutant	Avg Period	Max. Modeled Onshore Impact ($\mu\text{g}/\text{m}^3$)	Background Conc. ($\mu\text{g}/\text{m}^3$) ^a	Total Impact ($\mu\text{g}/\text{m}^3$)	State Standard ($\mu\text{g}/\text{m}^3$)	Federal Standard ($\mu\text{g}/\text{m}^3$)
NO ₂	1-hour	31.7	90.2	121.9	470	—
	annual	0.015	26	26	—	100
SO ₂	1-hour	0.08	18.3	18.4	655	—
	3-hour	0.02	39	39	—	1,300
	24-hour	<0.01	31	31	105	365
	annual	<0.01	10	10	—	80
CO	1-hour	37.2	8,469	8,506	23,000	40,000
	8-hour	3.6	4,921	4,925	10,000	10,000
PM ₁₀	24-hour	0.1	124	124	50	150
	annual	<0.01	29	29	20	50
PM _{2.5}	24-hour	0.1	32 ^b	32	—	65
	annual	<0.01	13	13	12	15

Note: ^a Background values for NO₂, SO₂, PM₁₀, and PM_{2.5} from El Rio monitoring station for 2002 (Station ID No. 061113001). Background values for CO from Ventura-Emma Wood State Beach monitoring station (Station ID No. 061112003).

^b Background values for PM_{2.5} based on 98th percentile.

Table 1-5
Comparison of Maximum Modeled Project Onshore Impacts with Ambient Air Quality Standards
(Stationary Sources and Marine Vessels, including LNG Carriers)

Pollutant	Avg Period	Max. Modeled Onshore Impact ($\mu\text{g}/\text{m}^3$)	Background Conc. ($\mu\text{g}/\text{m}^3$) ^a	Total Impact ($\mu\text{g}/\text{m}^3$)	State Standard ($\mu\text{g}/\text{m}^3$)	Federal Standard ($\mu\text{g}/\text{m}^3$)
NO ₂	1-hour	41.3	90.2	131.5	470	--
	annual	0.035	26	26	--	100
SO ₂	1-hour	0.08	18.3	18.4	655	--
	3-hour	0.02	39	39	--	1,300
	24-hour	<0.01	31	31	105	365
	annual	<0.01	10	10	--	80
	1-hour	41.8	8,469	8,511	23,000	40,000
CO	8-hour	4.9	4,921	4,926	10,000	10,000
	24-hour	0.1	124	124	50	150
PM ₁₀	annual	<0.01	29	29	20	50
	24-hour	0.1	32 ^b	32	--	65
PM _{2.5}	annual	<0.01	13	13	12	15

Note: ^a Background values for NO₂, SO₂, PM₁₀, and PM_{2.5} from El Rio monitoring station for 2002 (Station ID No. 061113001). Background values for CO from Ventura-Emma Wood State Beach monitoring station (Station ID No. 061112003).

^b 24-hour average background value for PM_{2.5} based on 98th percentile.

Tables 1-2 and 1-3 show that the maximum project impacts for all pollutants and averaging periods occur at sea. Modeled impacts for all pollutants and averaging periods are much lower onshore. Figures 1-1 through 1-4 and 1-9 through 1-12 show the modeled impacts of one-hour and annual NO₂ and 24-hour and annual PM₁₀/PM_{2.5} from the stationary sources on the FSRU alone and from the FSRU sources and the associated marine vessel activity in the vicinity of the project, respectively. Figures 1-5 through 1-8 and 1-13 through 1-16, respectively, show the onshore impacts in the Oxnard area for NO₂ and PM₁₀/PM_{2.5} for the FSRU sources alone and in combination with the marine vessels in greater detail. Figure 1-17 shows the locations of the receptors used in the modeling analysis upon which Figures 1-1 through 1-16 are based. Figure 1-18 shows the locations of the receptors used to evaluate impacts of the project in the South Coast Air Basin.

Figures 1-19 through 1-26 show the modeled impacts of one-hour and annual NO₂ and 24-hour and annual PM₁₀/PM_{2.5} from the stationary sources on the FSRU alone and from the FSRU sources and the associated marine vessel activity along the coastline of the South Coast Air Basin and compare these modeled impacts to the California and national ambient air quality standards.

2.0 ASSESSMENT OF SIGNIFICANCE

2.1 SIGNIFICANCE COMPARISON TABLES

In the following tables, the maximum onshore ambient air quality impacts of the Cabrillo Port LNG facility are compared with the relevant federal concentration-based significance criteria for each pollutant.

2.1.1 Nitrogen Dioxide

Table 2.1 compares the onshore NO₂ impacts from the proposed Project with the ambient air quality standards and the Class I and Class II significant impact levels for NO₂. EPA specifies that a major source will not be considered to cause or contribute to a violation of a national ambient air quality standard if the ambient impacts attributable to that major source are less than or equal to the Class II significance levels at any locality that does not or would not meet the applicable national standard. 40 CFR § 51.165(b)(2). Ventura County, in its entirety, is an attainment area for the federal NO₂ standard. Impacts below the significant impact levels demonstrate that the Project will have inconsequential impacts to onshore air quality.

Comparison of the modeling results at the worst-case receptors to the significant impact levels indicates that the Project will not have a material effect upon air quality. None of the onshore impact levels exceed the Class II NO₂ significance level of 1.0 µg/m³; maximum predicted impacts are two orders of magnitude below the significance threshold. Therefore, the facility is not expected to cause or contribute to an onshore violation of the NO₂ ambient air quality standard.

Table 2-1
Assessment of Significance for Onshore Impacts of Oxides of Nitrogen

Measure of Significance	Level	Concentration, µg/m ³	
		Stationary Sources	Stationary Sources and Marine Vessels
National AAQS	100 µg/m ³	0.015	0.035
Class II SIL	1.0 µg/m ³	0.015	0.035
Class II increment	25 µg/m ³	0.015	0.035
Class I SIL	0.1 µg/m ³	0.015	0.035
Class I increment	2.5 µg/m ³	0.015	0.035

2.1.2 Ozone

There are no approved air quality models for evaluating the ozone impacts of an individual project. However, the OCD modeling results and the unique attributes

of the proposed Project demonstrate that there is insignificant potential for the proposed Project to impact the onshore ozone nonattainment area.

The proposed Project's onshore NO₂ impacts are too small to materially contribute to ozone formation. The proposed Project's annual NO₂ impacts are only 4% of the Class II significant impact level. The proposed Project's short-term worst-case onshore NO₂ impact would be approximately 4.3 µg/m³ (8-hour average).

Based upon the minimal NO₂ impacts that will be experienced at the shoreline, the proposed Project is not expected to cause or materially contribute to any onshore violation of the ozone standard.

2.1.2 Carbon Monoxide

Table 2-2 compares the CO emission impacts from the proposed project with the ambient air quality standards and the Class II significant impact levels. EPA specifies that a major source will be considered to cause or contribute to a violation of a national ambient air quality standard if the ambient impacts attributable to that major source exceed the Class II significance levels at any locality that does not or would not meet the applicable national standard. 40 CFR § 51.165(b)(2). Ventura County, in its entirety, is an attainment area for the federal CO standards. Impacts below the significant impact levels demonstrate that the Project will have inconsequential impacts to onshore air quality.

A comparison of the modeling results at the worst-case receptors to the significant impact levels indicates that the Project will not have a material effect upon air quality. None of the impact levels exceed the CO significance levels of 500 µg/m³ (8-hour average) or 2,000 µg/m³ (1-hour average). Therefore, the facility is not expected to cause or contribute to any on-shore violation of the CO ambient air quality standard.

Table 2-2
Assessment of Significance for Onshore Impacts of Carbon Monoxide

Measure of Significance	Level	Concentration, µg/m ³	
		Stationary Sources	Stationary Sources and Marine Vessels
National AAQS – 1 hr	40,000 µg/m ³	37.2	41.8
National AAQS – 8 hr	10,000 µg/m ³	3.6	4.9
Class II SIL – 1 hr	2,000 µg/m ³	37.2	41.8
Class II SIL – 8 hr	500 µg/m ³	3.6	4.9

2.1.3 Sulfur Dioxide

Table 2-3 compares the modeled SO₂ emission impacts from the proposed Project to the ambient air quality standards and the Class I and Class II significant impact levels. EPA specifies that a major source will be considered to cause or contribute to a violation of a national ambient air quality standard if the ambient impacts attributable to that major source exceed the Class II significance levels at any locality that does not or would not meet the applicable national standard. 40 CFR § 51.165(b)(2). Ventura County, in its entirety, is an attainment area for the federal SO₂ standards. Impacts below the significant impact levels demonstrate that the Project will have inconsequential impacts to onshore air quality.

A comparison of the modeling results at the worst-case receptors to the significant impact levels indicates that the Project will not have a material effect upon air quality. None of the impact levels exceed the Class II SO₂ significance levels of 1 µg/m³ (annual average), 5 µg/m³ (24-hour average) or 25 µg/m³ (3-hour average). Therefore, the facility is not expected to cause or contribute to any on-shore violation of the SO₂ ambient air quality standard.

Table 2-3
Assessment of Significance for Onshore Impacts of Sulfur Dioxide

Measure of Significance	Level	Concentration, µg/m ³	
		Stationary Sources	Stationary Sources and Marine Vessels
National AAQS – 3 hr	1300 µg/m ³	0.02	0.02
National AAQS – 24 hr	365 µg/m ³	<0.01	<0.01
National AAQS – annual	80 µg/m ³	<0.01	<0.01
Class II SIL – 3 hr	25 µg/m ³	0.02	0.02
Class II SIL – 24 hr	5 µg/m ³	<0.01	<0.01
Class II SIL – annual	1.0 µg/m ³	<0.01	<0.01
Class I SIL – 3 hr	1.0 µg/m ³	0.02	0.02
Class I SIL – 24 hr	0.2 µg/m ³	<0.01	<0.01
Class I SIL – annual	0.1 µg/m ³	<0.01	<0.01

2.1.4 Fine Particulates

Table 2-4 compares the ambient PM₁₀ emission impacts from the proposed Project to the ambient air quality standards and the Class I and Class II significant impact levels. EPA specifies that a major source will be considered to cause or contribute to a violation of a national ambient air quality standard if the ambient impacts attributable to that major source exceed the Class II significance

levels at any locality that does not or would not meet the applicable national standard. 40 CFR § 51.165(b)(2). Ventura County, in its entirety, is an attainment area for the federal PM₁₀ and PM_{2.5} standards. Impacts below the significant impact levels demonstrate that the Project will have inconsequential impacts to onshore air quality.

A comparison of the modeling results at the worst-case receptors to the significant impact levels indicates that the Project will not have a material effect upon air quality. None of the impact levels exceed the Class II PM₁₀ significance levels of 1 µg/m³ (annual average) or 5 µg/m³ (24-hour average). While significance levels have yet to be developed for PM_{2.5}, the combination of onshore attainment status and the extremely low ambient impacts indicate that the proposed Project will have an insignificant effect upon air quality. Therefore, the facility is not expected to cause or contribute to any on-shore violation of the PM₁₀ or PM_{2.5} ambient air quality standards.

Table 2-4
Assessment of Significance for Onshore Impacts of Fine Particulates (PM₁₀)

Measure of Significance	Level	Concentration, µg/m ³	
		Stationary Sources	Stationary Sources and Marine Vessels
National AAQS - 24 hr	150 µg/m ³	0.1	0.1
National AAQS – annual	50 µg/m ³	<0.01	<0.01
Class II SIL -24 hr	5 µg/m ³	0.1	0.1
Class II SIL – annual	1 µg/m ³	<0.01	<0.01
Class I SIL - 24 hr	0.3 µg/m ³	0.1	0.1
Class I SIL – annual	0.2 µg/m ³	<0.01	<0.01

Table 2-5
Assessment of Significance for Onshore Impacts of Fine Particulates (PM_{2.5})

Measure of Significance	Level	Concentration, µg/m ³	
		Stationary Sources	Stationary Sources and Marine Vessels
National AAQS - 24 hr	65 µg/m ³	0.1	0.1
National AAQS – annual	15 µg/m ³	<0.01	<0.01

2.2 AMBIENT AIR QUALITY IMPACTS

As shown in the modeling results presented in Section 1, the maximum ambient impacts attributable to the proposed Project for all pollutants and averaging periods except annual NO_2 are expected to be less than the significant impact levels at the worst-case receptors. Impacts will be lower still onshore. As a result, the operation of the proposed Project will not cause or contribute to exceedances of the NAAQS for any pollutant. Accordingly, the Cabrillo Port LNG Terminal will not have a material impact on onshore ambient air quality.

2.3 OVERALL ASSESSMENT OF SIGNIFICANCE

The analysis of impacts on air quality offshore within 22 miles of the facility and onshore between Oxnard to the north and the Palos Verdes Peninsula to the south shows that the operation of the Cabrillo Port LNG Terminal will not cause or contribute to violations of the NAAQS. Further, the onshore impacts are not considered to be significant when compared with relevant measures of significance.

APPENDIX 1

EMISSION RATES AND STACK PARAMETERS FOR MODELING

**Emission Rates and Stack Parameters for Refined Modeling
BHP Cabrillo LNG Deepwater Port: FSRU Sources**

	Stack Diam, m	Stack Height, m	Exh Temp, Deg K	Exhaust Flow, m ³ /s	Exhaust Velocity, m/s	Emission Rate, g/s			
						NOx	SO ₂	CO	PM ₁₀
Averaging Period: 1 hour									
Main generators (total)	1.732	33,000	699.67	126.38	53.637	0.688	0.004	1.169	n/a
Vaporizers (total)	2.000	35,000	294.11	44.994	14.322	1.407	0.010	4.284	n/a
Emergency generator	0.660	25,000	699.67	24.591	71.792	6.533	0.007	4.083	n/a
Fire pump	0.254	25,000	699.67	4.015	79.235	0.933	0.001	0.583	n/a
Life boat	0.076	1,000	699.67	0.437	95.864	0.101	0.000	0.078	n/a
Averaging Period: 3 hours									
Main generators (total)	1.732	33,000	699.67	126.38	53.637	n/a	3.965E-03	n/a	n/a
Vaporizers (total)	2.000	35,000	294.11	44.994	14.322	n/a	9.555E-03	n/a	n/a
Emergency generator	0.660	25,000	699.67	24.591	71.792	n/a	2.340E-03	n/a	n/a
Fire pump	0.254	25,000	699.67	4.015	79.235	n/a	3.820E-04	n/a	n/a
Life boat	0.076	1,000	699.67	0.437	95.864	n/a	4.159E-05	n/a	n/a
Averaging Period: 8 hours									
Main generators (total)	1.732	33,000	699.67	126.38	53.637	0.688	n/a	1.169	n/a
Vaporizers (total)	2.000	35,000	294.11	44.994	14.322	1.407	n/a	4.284	n/a
Emergency generator	0.660	25,000	699.67	24.591	71.792	0.817	n/a	0.510	n/a
Fire pump	0.254	25,000	699.67	4.015	79.235	0.117	n/a	0.073	n/a
Life boat	0.076	1,000	699.67	0.437	95.864	0.013	n/a	0.010	n/a
Averaging Period: 24 hours									
Main generators (total)	1.732	33,000	699.67	126.38	53.637	n/a	3.965E-03	n/a	0.455
Vaporizers (total)	2.000	35,000	294.11	44.994	14.322	n/a	9.555E-03	n/a	0.109
Emergency generator	0.660	25,000	699.67	24.591	71.792	n/a	2.924E-04	n/a	0.010
Fire pump	0.254	25,000	699.67	4.015	79.235	n/a	4.775E-05	n/a	1.389E-03
Life boat	0.076	1,000	699.67	0.437	95.864	n/a	5.199E-06	n/a	2.593E-04
Averaging Period: Annual									
Main generators (total)	1.732	33,000	699.67	126.38	53.637	0.352	2.028E-03	n/a	0.233
Vaporizers (total)	2.000	35,000	294.11	44.994	14.322	1.407	9.555E-03	n/a	0.109
Emergency generator	0.660	25,000	699.67	24.591	71.792	0.075	8.012E-05	n/a	2.664E-03
Fire pump	0.254	25,000	699.67	4.015	79.235	0.011	1.308E-05	n/a	3.805E-04
Life boat	0.076	1,000	699.67	0.437	95.864	2.886E-07	3.561E-10	n/a	3.552E-05

Emission Rates and Stack Parameters for Refined Modeling
 BHP Cabrillo LNG Deepwater Port: Vessels in District and Federal Waters

	Effective Stack Diam, m	Stack Height, m	Exh Temp, Deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	Emission Rate, g/s			
						NOx	SO2	CO	PM10
Averaging Period: 1 hour									
Assist Tugs DW	0.777	9.059	699.67	14.71	31.009	n/a	n/a	n/a	n/a
Crew Boat DW	0.330	5.000	699.67	2.30	26.917	0.217	5.896E-05	0.199	n/a
Assist Tugs FW1	0.777	9.059	699.67	14.71	31.009	n/a	n/a	n/a	n/a
Crew Boat FW1	0.330	5.000	699.67	2.30	26.917	n/a	n/a	n/a	n/a
Assist Tugs FW2	0.777	9.059	699.67	14.71	31.009	0.932	5.315E-04	1.316	n/a
LNG Carrier FW2	0.800	44.000	699.67	27.90	55.512	3.765	7.644E-04	2.432	n/a
Crew Boat FW2	0.330	5.000	699.67	2.30	26.917	n/a	n/a	n/a	n/a
Assist Tugs FW3	0.777	9.059	699.67	14.71	31.009	n/a	n/a	n/a	n/a
LNG Carrier FW3	0.800	44.000	699.67	27.90	55.512	n/a	n/a	n/a	n/a
Averaging Period: 3 hours									
Assist Tugs DW	0.777	9.059	699.67	14.71	31.009	n/a	n/a	n/a	n/a
Crew Boat DW	0.330	5.000	699.67	2.30	26.917	n/a	1.965E-05	n/a	n/a
Assist Tugs FW1	0.777	9.059	699.67	14.71	31.009	n/a	n/a	n/a	n/a
Crew Boat FW1	0.330	5.000	699.67	2.30	26.917	n/a	7.181E-05	n/a	n/a
Assist Tugs FW2	0.777	9.059	699.67	14.71	31.009	n/a	5.315E-04	n/a	n/a
LNG Carrier FW2	0.800	44.000	699.67	27.90	55.512	n/a	7.644E-04	n/a	n/a
Crew Boat FW2	0.330	5.000	699.67	2.30	26.917	n/a	2.494E-05	n/a	n/a
Assist Tugs FW3	0.777	9.059	699.67	14.71	31.009	n/a	n/a	n/a	n/a
LNG Carrier FW3	0.800	44.000	699.67	27.90	55.512	n/a	n/a	n/a	n/a
Averaging Period: 8 hours									
Assist Tugs DW	0.777	9.059	699.67	14.71	31.009	n/a	n/a	n/a	n/a
Crew Boat DW	0.330	5.000	699.67	2.30	26.917	5.417E-02	n/a	4.976E-02	n/a
Assist Tugs FW1	0.777	9.059	699.67	14.71	31.009	n/a	n/a	n/a	n/a
Crew Boat FW1	0.330	5.000	699.67	2.30	26.917	0.099	n/a	9.091E-02	n/a
Assist Tugs FW2	0.777	9.059	699.67	14.71	31.009	0.932	n/a	1.316	n/a
LNG Carrier FW2	0.800	44.000	699.67	27.90	55.512	3.765	n/a	2.432	n/a
Crew Boat FW2	0.330	5.000	699.67	2.30	26.917	6.875E-02	n/a	6.316E-02	n/a
Assist Tugs FW3	0.777	9.059	699.67	14.71	31.009	n/a	n/a	n/a	n/a
LNG Carrier FW3	0.800	44.000	699.67	27.90	55.512	n/a	n/a	n/a	n/a
Averaging Period: 24 hours									
Assist Tugs DW	0.777	9.059	699.67	14.71	31.009	n/a	6.141E-05	n/a	5.106E-03
Crew Boat DW	0.330	5.000	699.67	2.30	26.917	n/a	4.913E-06	n/a	2.978E-04
Assist Tugs FW1	0.777	9.059	699.67	14.71	31.009	n/a	1.248E-04	n/a	1.033E-02
Crew Boat FW1	0.330	5.000	699.67	2.30	26.917	n/a	1.795E-05	n/a	1.088E-03
Assist Tugs FW2	0.777	9.059	699.67	14.71	31.009	n/a	4.979E-04	n/a	4.101E-02
LNG Carrier FW2	0.800	44.000	699.67	27.90	55.512	n/a	6.784E-04	n/a	4.137E-02
Crew Boat FW2	0.330	5.000	699.67	2.30	26.917	n/a	6.236E-06	n/a	3.779E-04
Assist Tugs FW3	0.777	9.059	699.67	14.71	31.009	n/a	1.037E-04	n/a	8.641E-03
LNG Carrier FW3	0.800	44.000	699.67	27.90	55.512	n/a	3.368E-04	n/a	2.054E-02
Averaging Period: Annual									
Assist Tugs DW	0.777	9.059	699.67	14.71	31.009	7.441E-03	4.374E-06	n/a	3.637E-04
Crew Boat DW	0.330	5.000	699.67	2.30	26.917	9.003E-03	2.450E-06	n/a	1.485E-04
Assist Tugs FW1	0.777	9.059	699.67	14.71	31.009	0.031	1.778E-05	n/a	1.471E-03
Crew Boat FW1	0.330	5.000	699.67	2.30	26.917	3.290E-02	8.952E-06	n/a	5.425E-04
Assist Tugs FW2	0.777	9.059	699.67	14.71	31.009	0.904	5.159E-04	n/a	4.250E-02
LNG Carrier FW2	0.800	44.000	699.67	27.90	55.512	1.191	2.417E-04	n/a	1.474E-02
Crew Boat FW2	0.330	5.000	699.67	2.30	26.917	1.143E-02	3.110E-06	n/a	1.885E-04
Assist Tugs FW3	0.777	9.059	699.67	14.71	31.009	0.025	1.477E-05	n/a	1.231E-03
LNG Carrier FW3	0.800	44.000	699.67	27.90	55.512	0.589	1.196E-04	n/a	7.293E-03

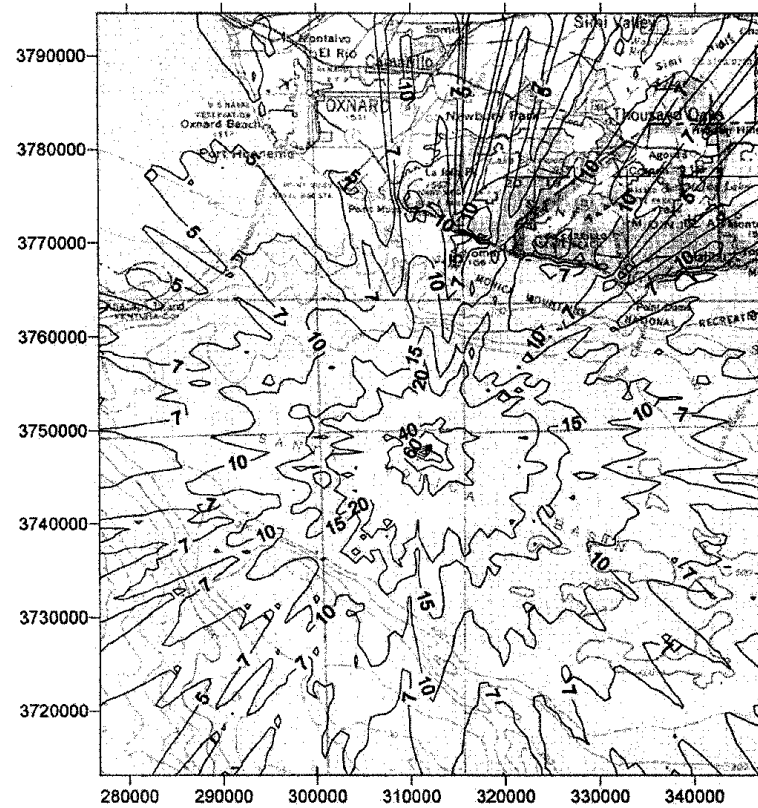
LNG Carrier stack height includes hull height, which is 21 meters above water line.

FW1 represents activity between District Water Boundary and FSRU

FW2 represents activity within safety zone and at FSRU

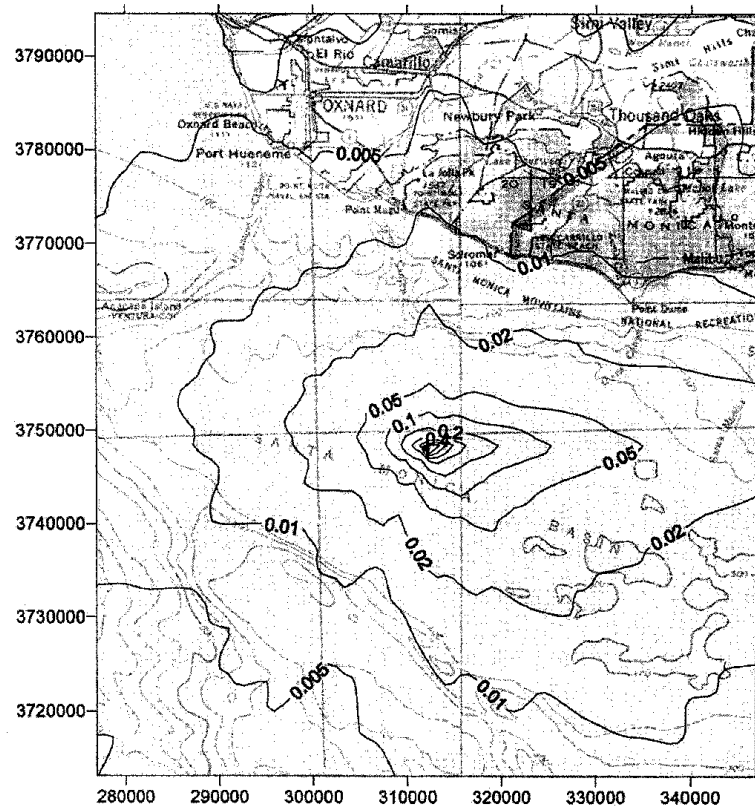
FW3 represents activity between Safety Zone and Federal Waters Boundary

Figure 1-1
BHP Cabrillo LNG Deepwater Port
One-Hour Average NO₂ Impacts: FSRU Sources Only
Maximum Modeled Impacts



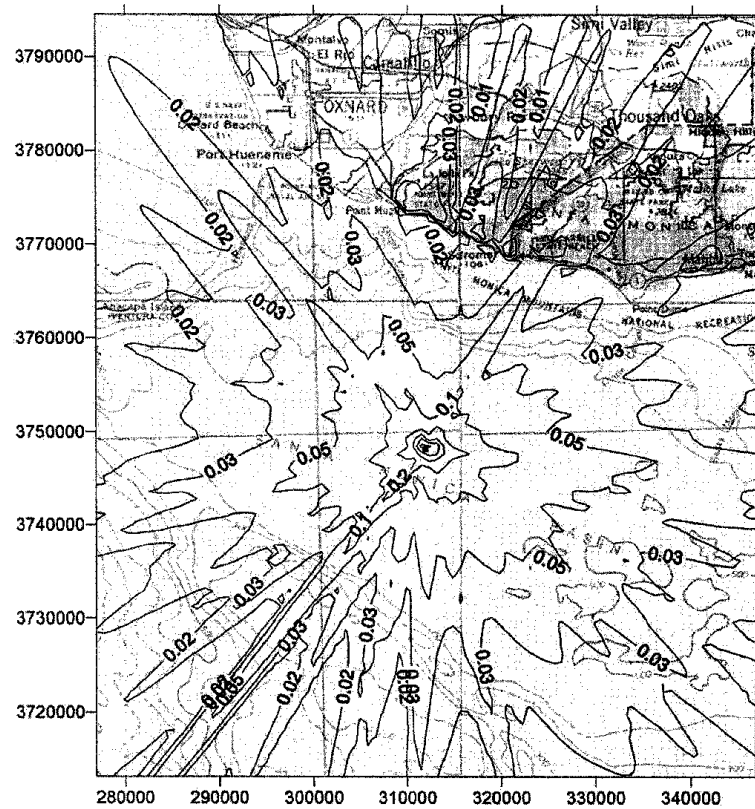
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-2
BHP Cabrillo LNG Deepwater Port
Annual Average NO₂ Impacts: FSRU Sources Only
Maximum Modeled Impacts



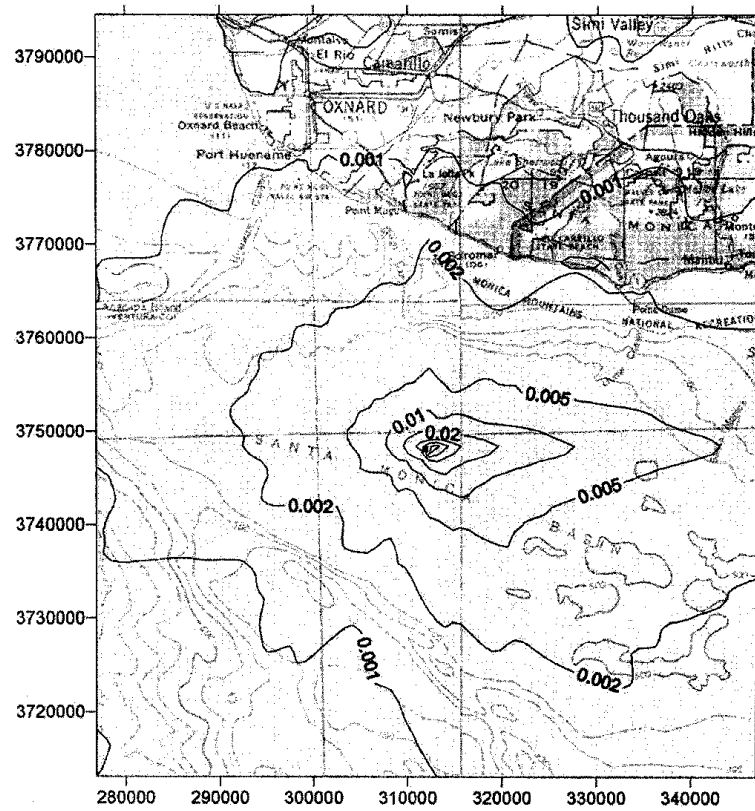
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-3
BHP Cabrillo LNG Deepwater Port
24-hr Average PM₁₀ Impacts: FSRU Sources Only
Maximum Modeled Impacts



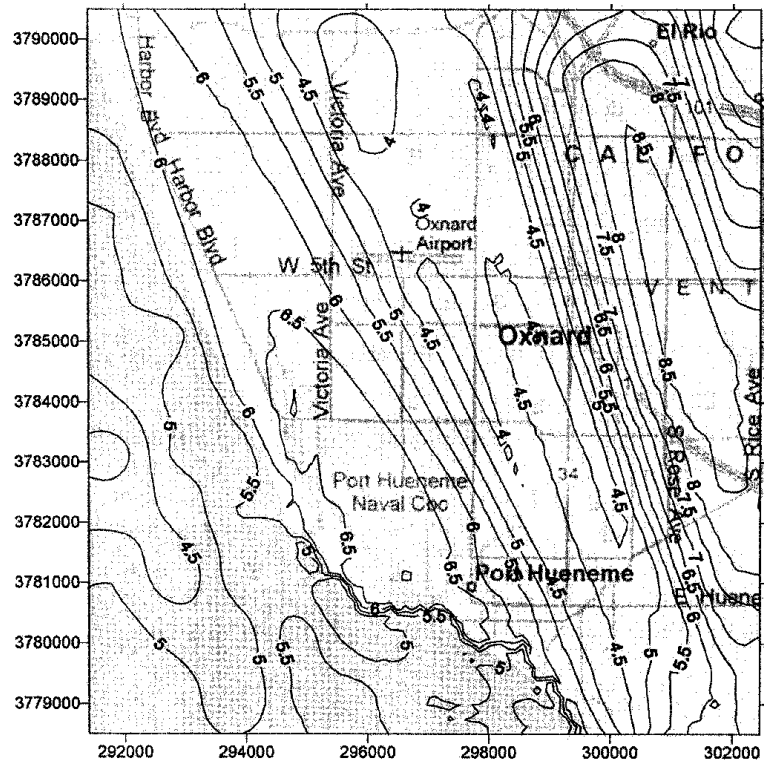
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-4
BHP Cabrillo LNG Deepwater Port
Annual Average PM₁₀ Impacts: FSRU Sources Only
Maximum Modeled Impacts



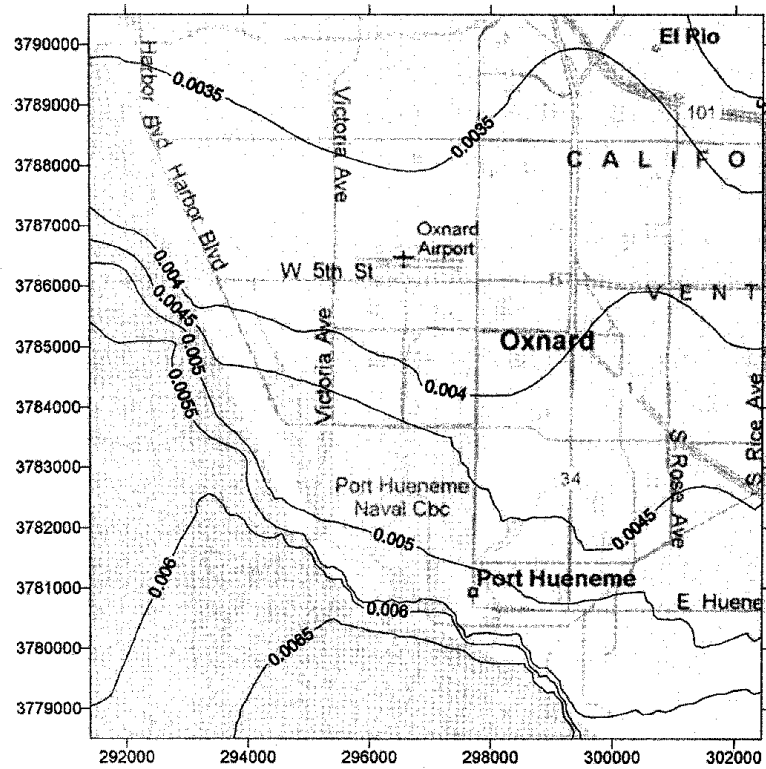
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-5
BHP Cabrillo LNG Deepwater Port
One-Hour Average NO₂ Impacts: FSRU Sources Only
Maximum Modeled Impacts Over Oxnard Area



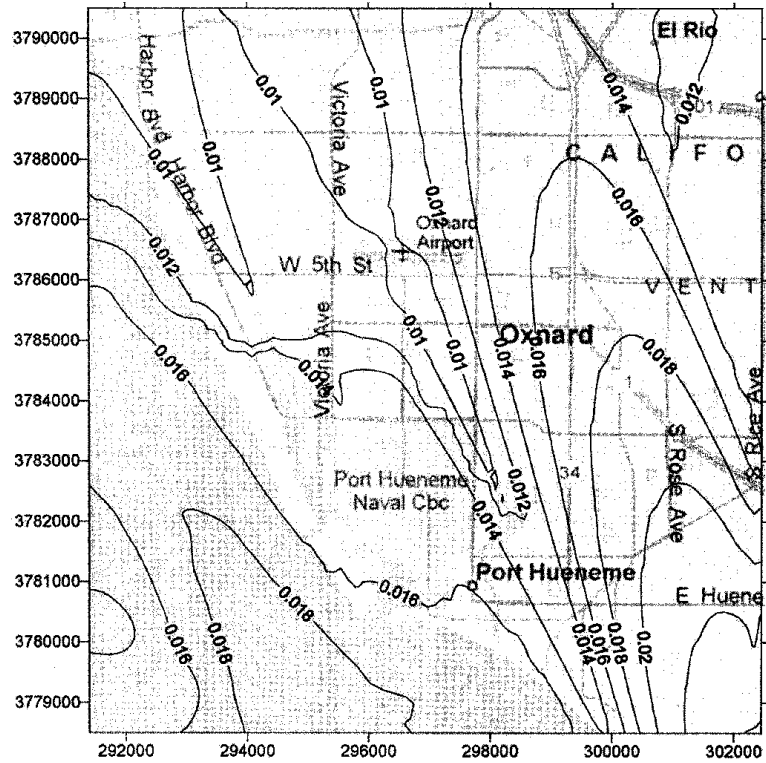
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-6
 BHP Cabrillo LNG Deepwater Port
 Annual Average NO₂ Impacts: FSRU Sources Only
 Maximum Modeled Impacts Over Oxnard Area



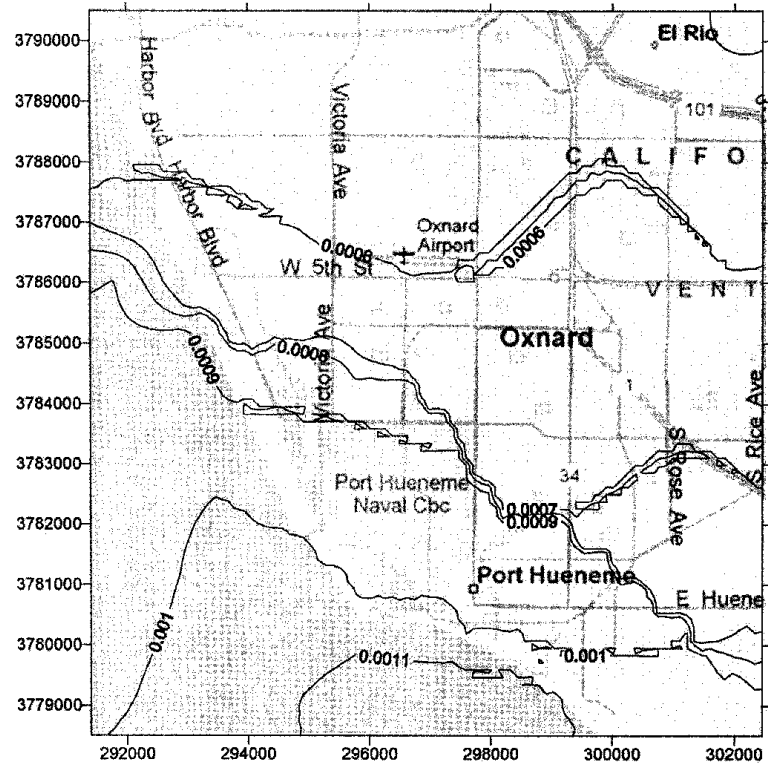
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-7
BHP Cabrillo LNG Deepwater Port
24-hr Average PM₁₀ Impacts: FSRU Sources Only
Modeled Impacts Over Oxnard Area



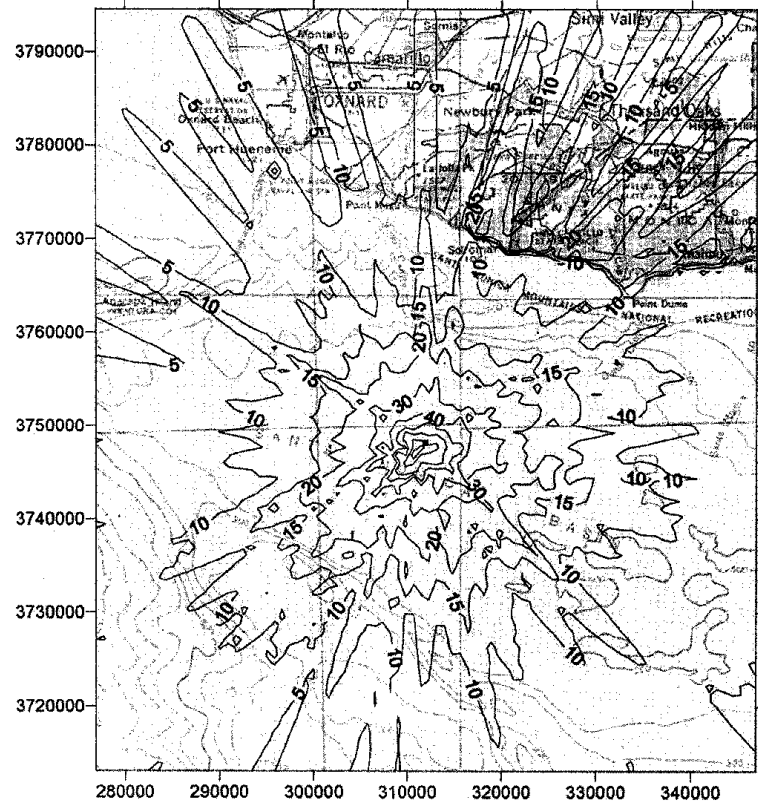
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-8
BHP Cabrillo LNG Deepwater Port
Annual Average PM₁₀ Impacts: FSRU Sources Only
Maximum Modeled Impacts Over Oxnard Area



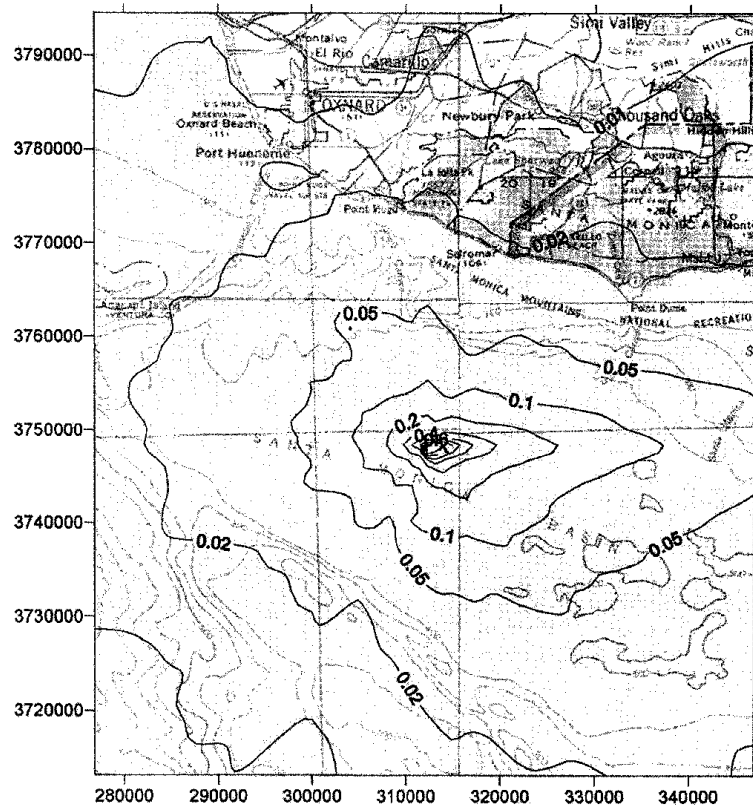
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-9
BHP Cabrillo LNG Deepwater Port
One-Hour Average NO₂ Impacts: FSRU Sources and Marine Vessels
Maximum Modeled Impacts



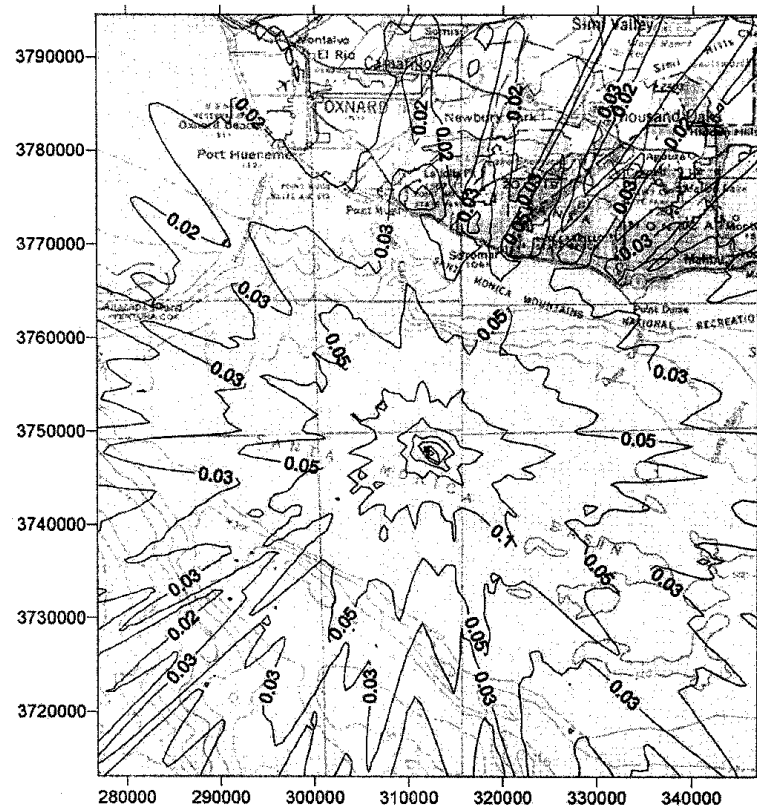
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-10
BHP Cabrillo LNG Deepwater Port
Annual Average NO₂ Impacts: FSRU Sources and Marine Vessels
Maximum Modeled Impacts



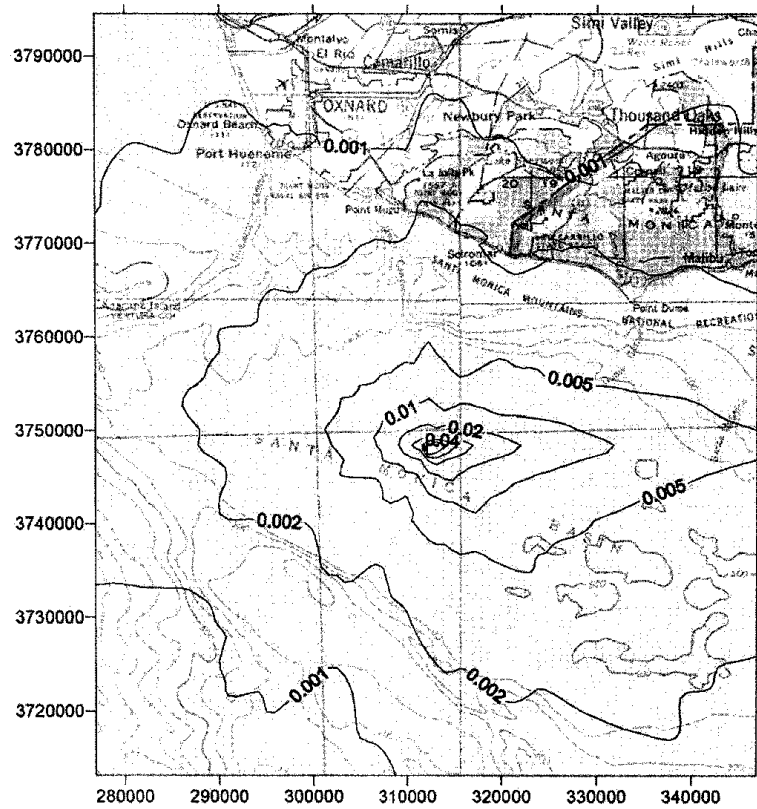
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-11
BHP Cabrillo LNG Deepwater Port
24-hr Average PM₁₀ Impacts: FSRU Sources and Marine Vessels
Maximum Modeled Impacts



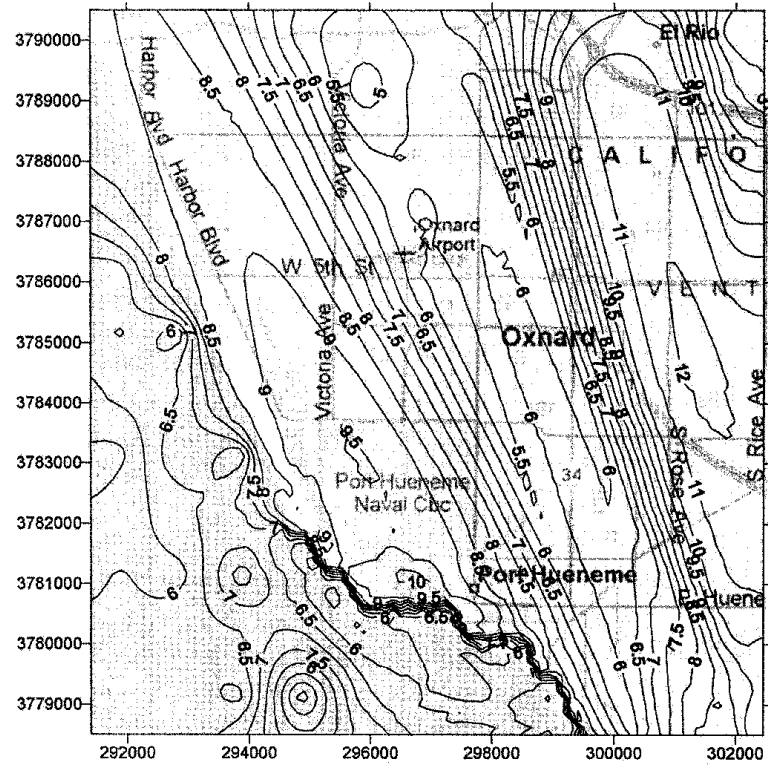
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-12
BHP Cabrillo LNG Deepwater Port
Annual Average PM₁₀ Impacts: FSRU Sources and Marine Vessels
Maximum Modeled Impact



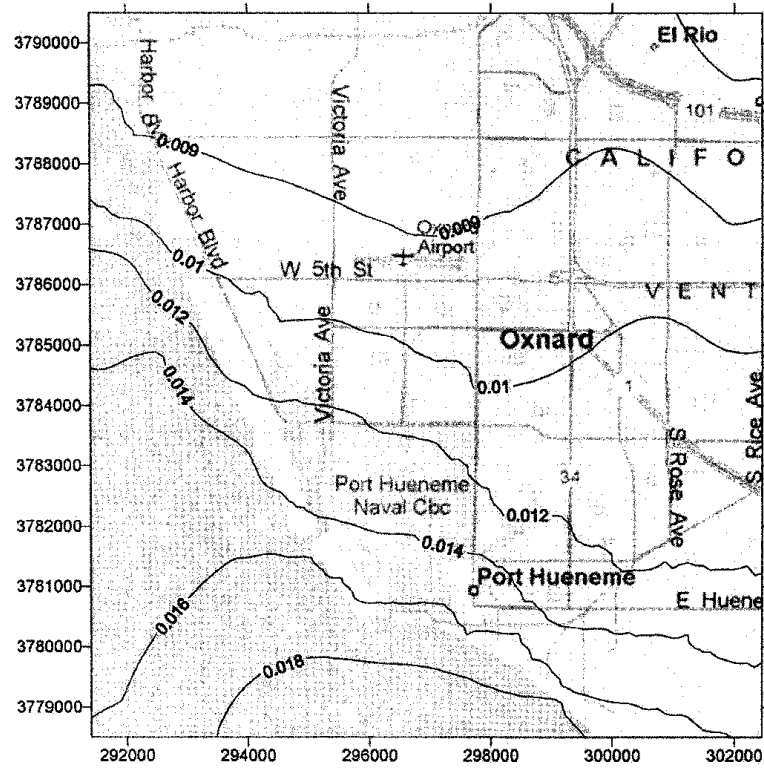
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-13
BHP Cabrillo LNG Deepwater Port
One-Hour Average NO₂ Impacts: FSRU Sources and Marine Vessels
Maximum Modeled Impacts Over Oxnard Area



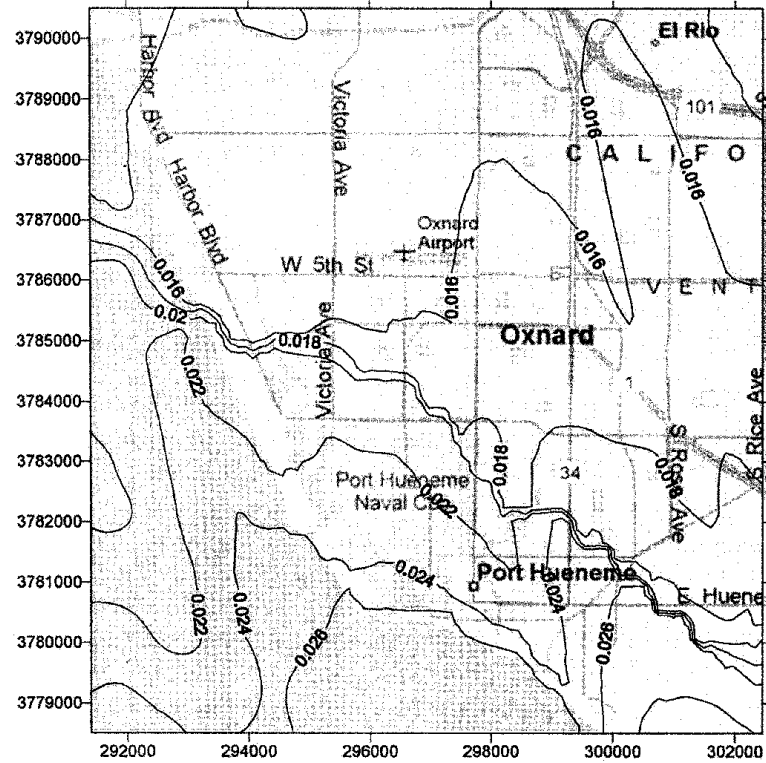
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-14
BHP Cabrillo LNG Deepwater Port
Annual Average NO₂ Impacts: FSRU Sources and Marine Vessels
Maximum Modeled Impacts Over Oxnard Area



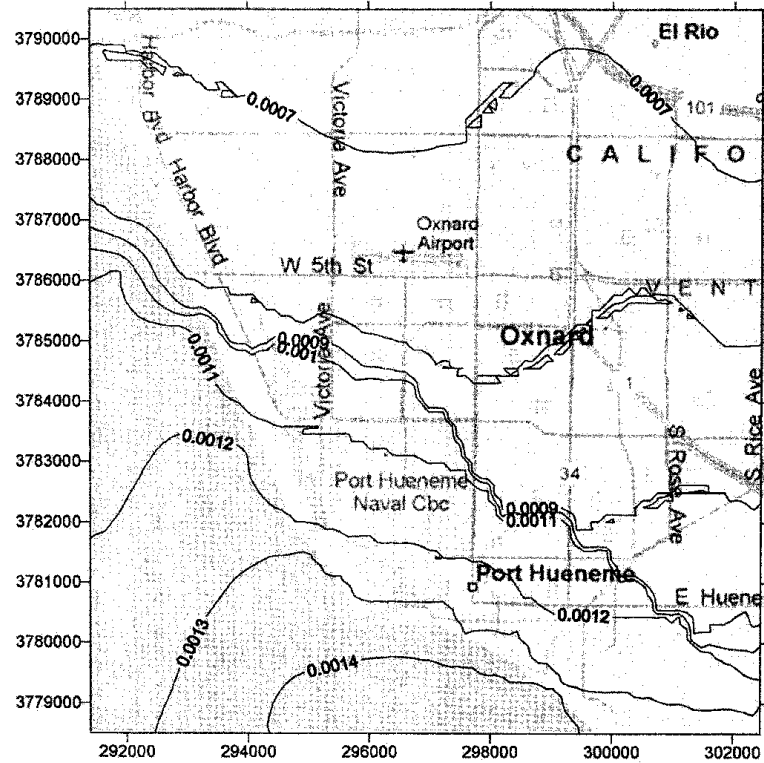
Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-15
BHP Cabrillo LNG Deepwater Port
24-hr Average PM₁₀ Impacts: FSRU Sources and Marine Vessels
Maximum Modeled Impacts Over Oxnard Area



Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-16
BHP Cabrillo LNG Deepwater Port
Annual Average PM₁₀ Impacts: FSRU Sources and Marine Vessels
Maximum Modeled Impacts Over Oxnard Area



Note: Lines show contours of constant concentration; impacts are in units of $\mu\text{g}/\text{m}^3$.

Figure 1-18
BHP Cabrillo LNG Deepwater Port
Locations of Receptors Used to Evaluate Project Impacts in the
South Coast Air Basin

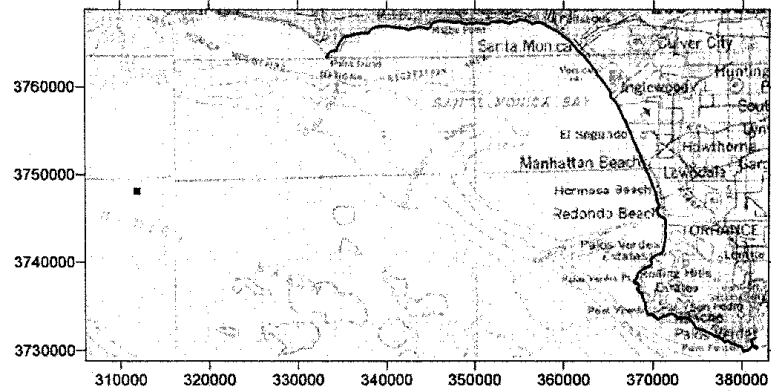


Figure 1-19
BHP Cabrillo LNG Deepwater Port
One-Hour Average NO2 Impacts: FSRU Sources Only
Maximum Modeled Impacts

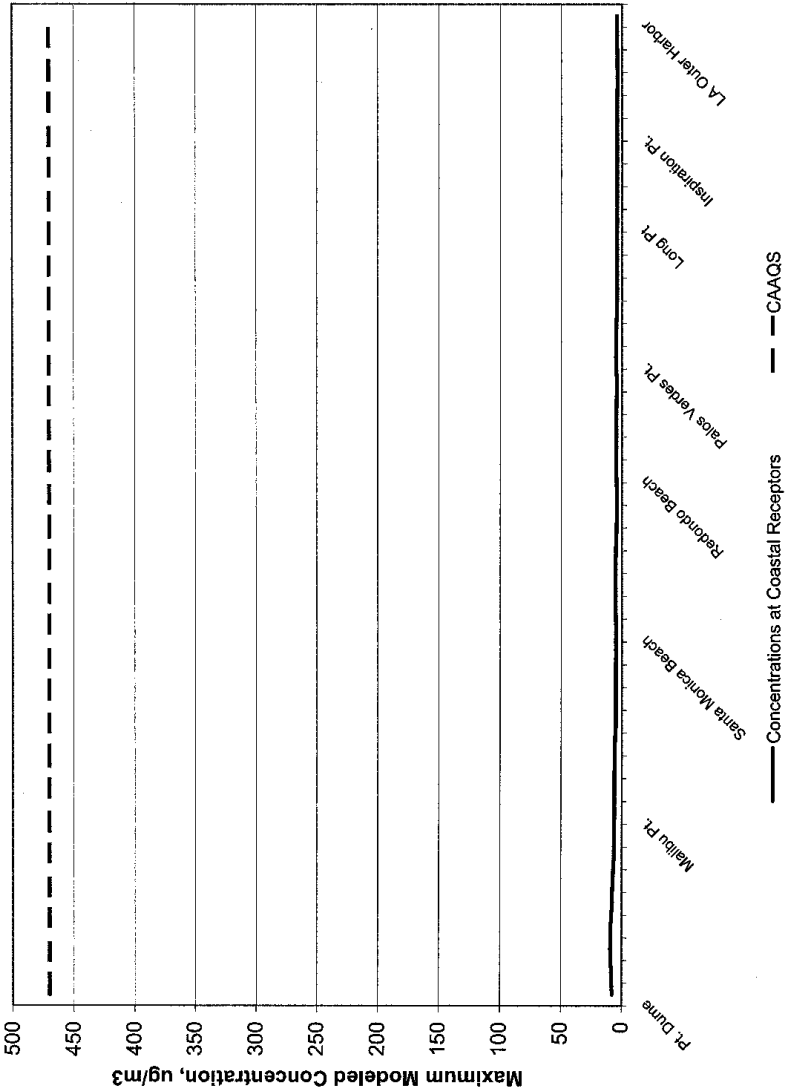


Figure 1-20
BHP Cabrillo LNG Deepwater Port
Annual Average NO₂ Impacts: FSRU Sources Only
Maximum Modeled Impacts

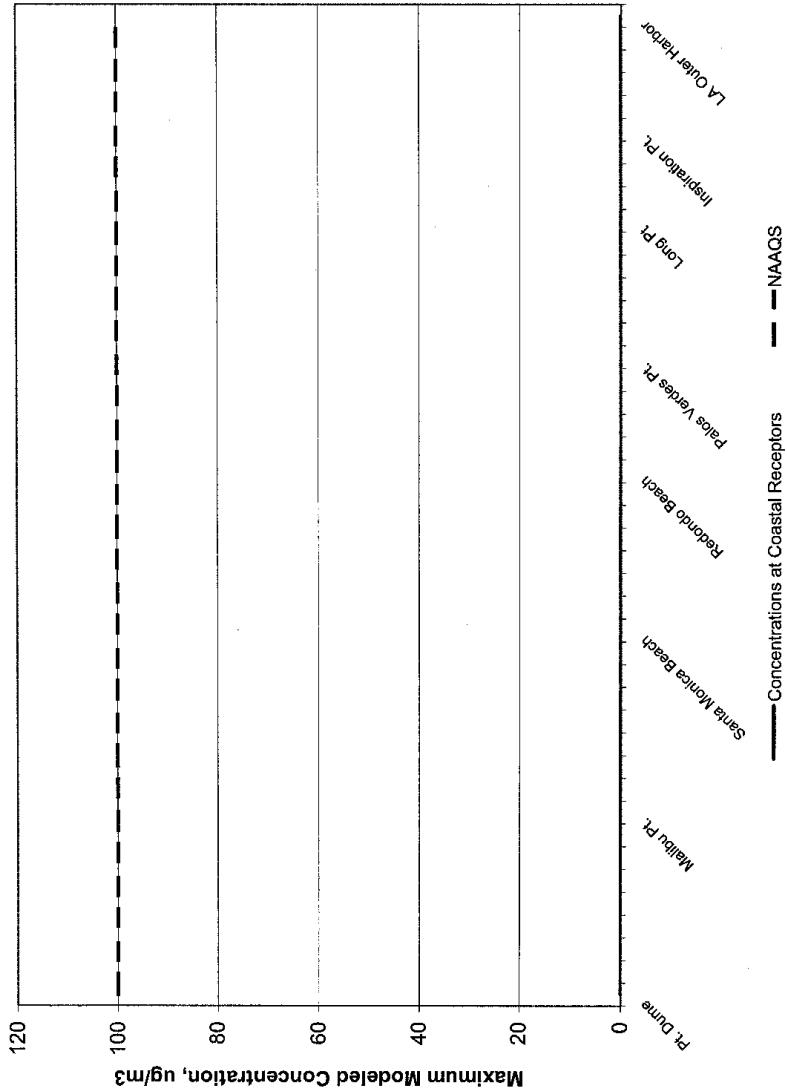


Figure 1-21
BHP Cabrillo LNG Deepwater Port
24-Hour Average PM10/PM2.5 Impacts: FSRU Sources Only
Maximum Modeled Impacts

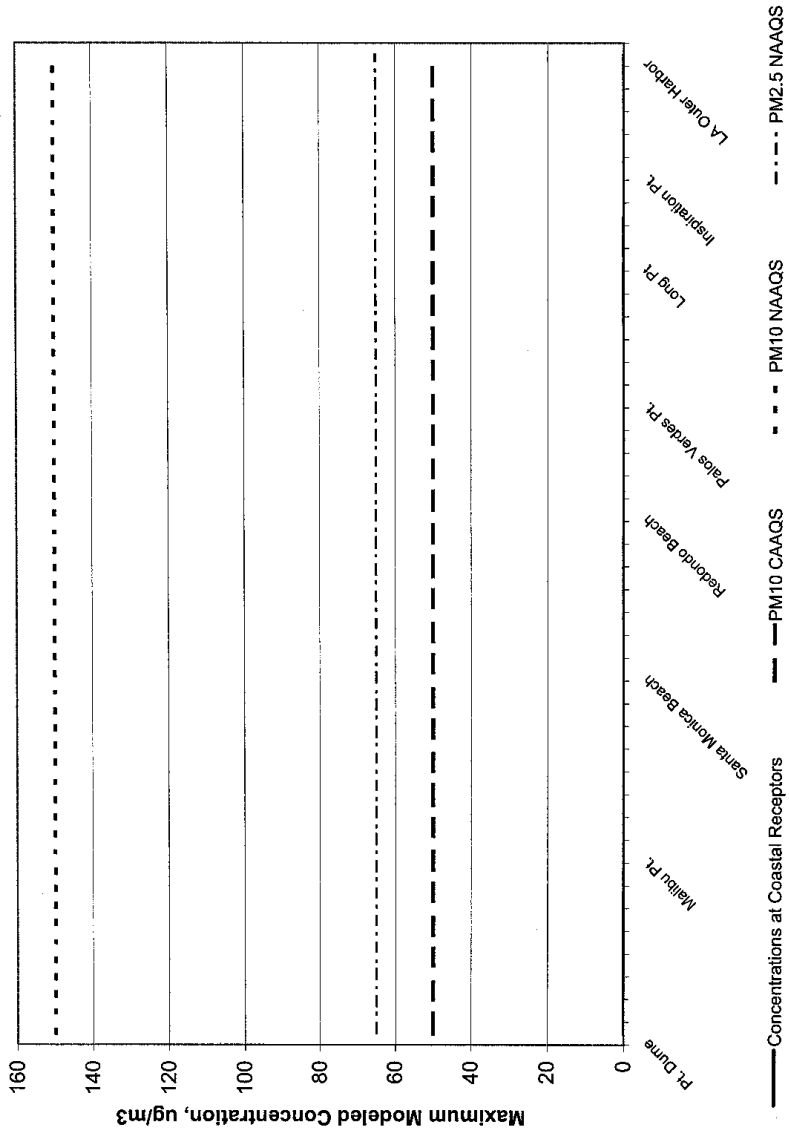


Figure 1-22
 BHP Cabrillo LNG Deepwater Port
 Annual Average PM10/PM2.5 Impacts: FSRU Sources Only
 Maximum Modeled Impacts

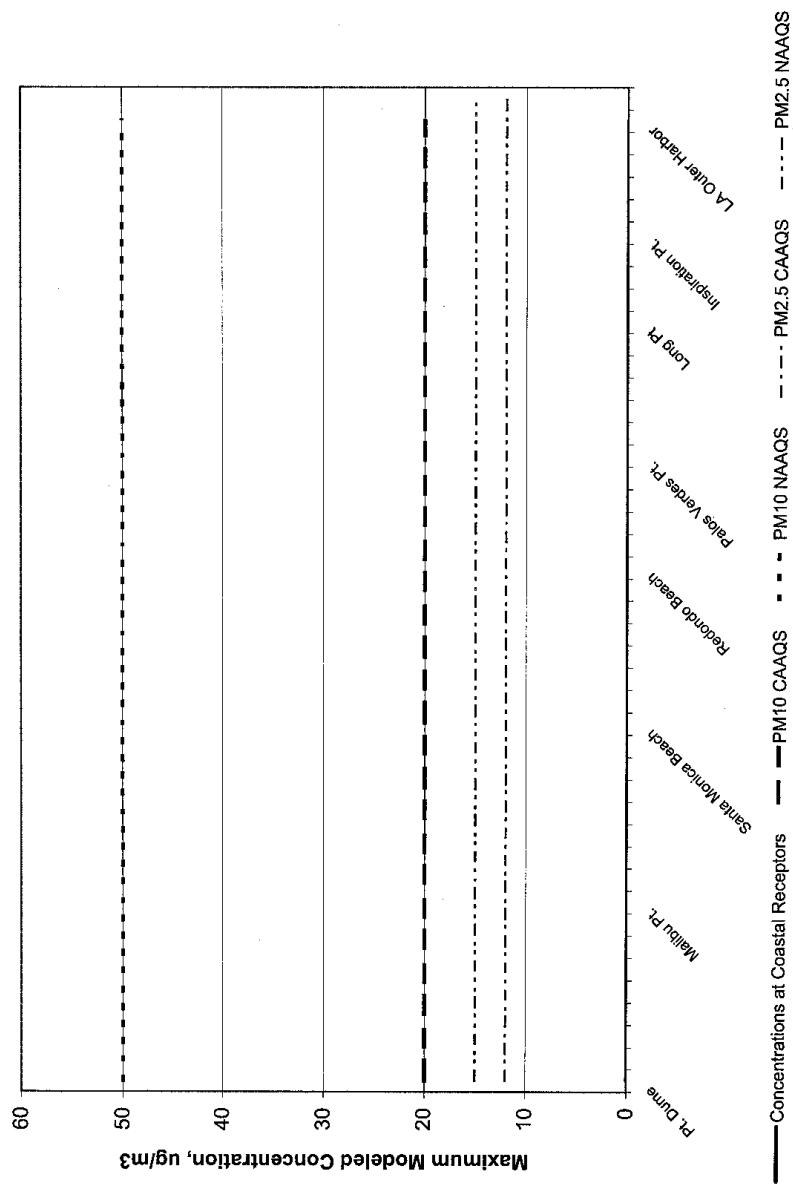


Figure 1-23
BHP Cabrillo LNG Deepwater Port
One-Hour Average NO₂ Impacts: FSRU Sources and Marine Vessels
Maximum Modeled Impacts

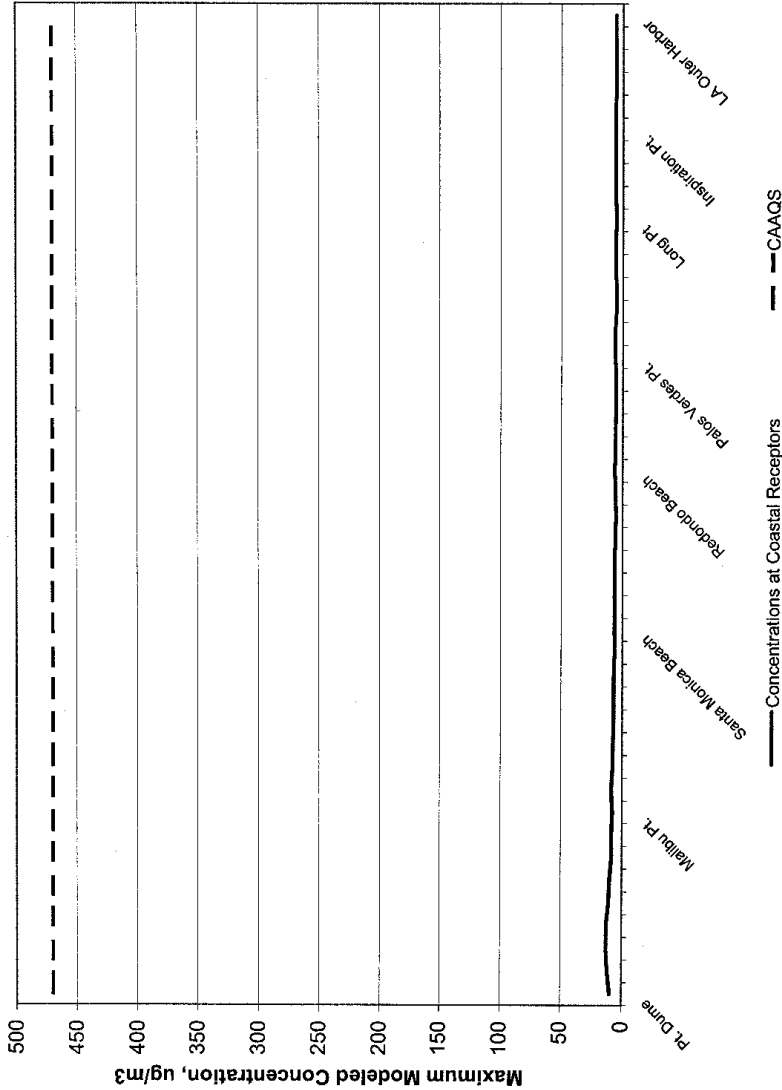


Figure 1-24
 BHP Cabrillo LNG Deepwater Port
 Annual Average NO₂ Impacts: FSRU Sources and Marine Vessels
 Maximum Modeled Impacts

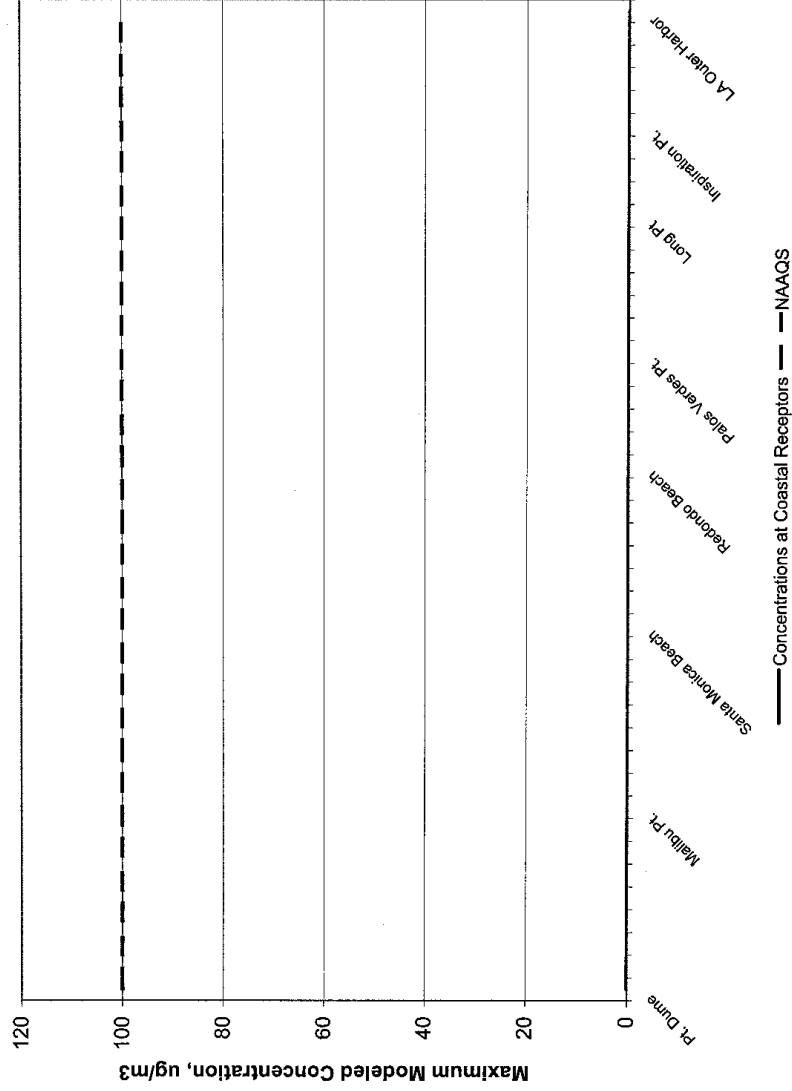


Figure 1-25
 BHP Cabrillo LNG Deepwater Port
 24-Hour Average PM10/PM2.5 Impacts: FSRU Sources and Marine Vessels
 Maximum Modeled Impacts

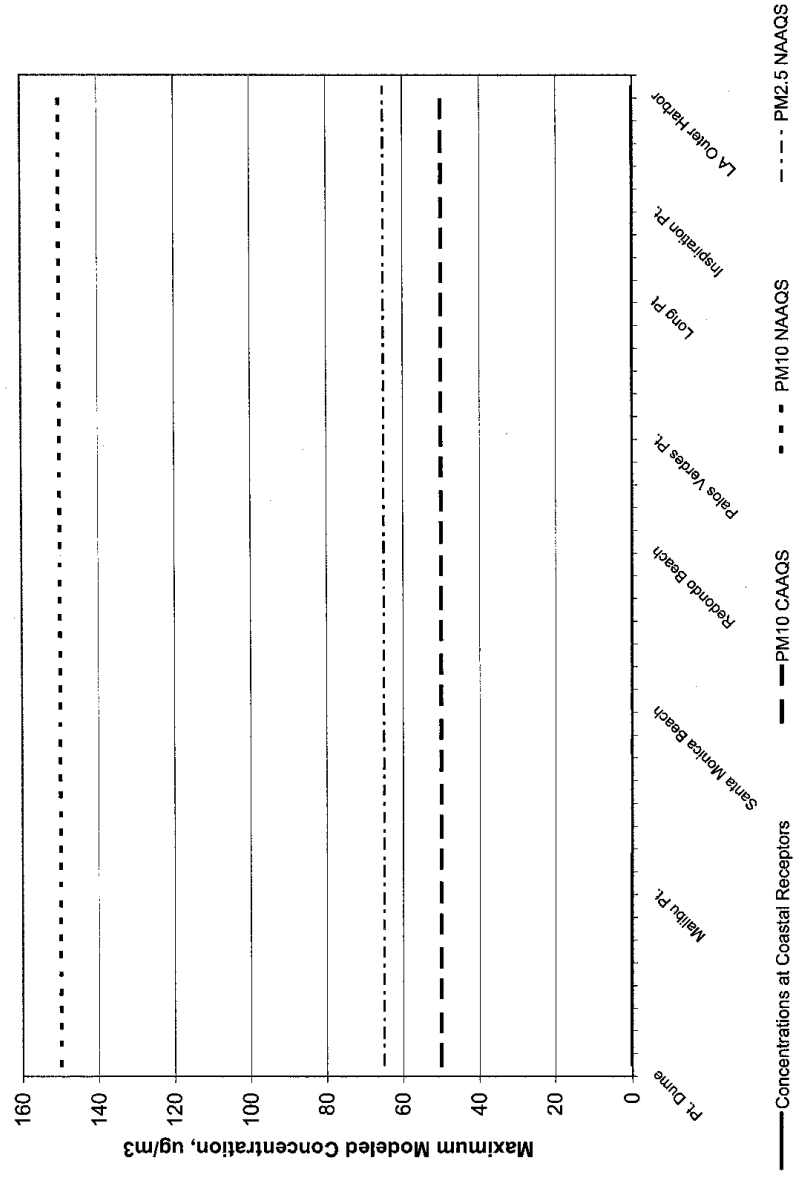


Figure 1-26
BHP Cabrillo LNG Deepwater Port
Annual Average PM10/PM2.5 Impacts: FSRU Sources and Marine Vessels
Maximum Modeled Impacts

